THE UNIVERSITY OF ALBERTA

RELEASE FORM

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TITLE OF THESIS: Rural Residential Subdivision in Parkland County, Alberta: An analysis of the interrelations between environmental factors, location, and land values, as influenced by the process of real-estate development

DEGREE FOR WHICH THESIS WAS PRESENTED: M.A.

YEAR THIS DEGREE GRANTED: 1976

THE UNIVERSITY OF ALBERTA

RURAL RESIDENTIAL SUBDIVISION PARKLAND COUNTY, ALBERTA: AN ANALYSIS OF THE INTERRELATIONS BETWEEN ENVIRONMENTAL FACTORS, LOCATION, AND LAND VALUES, AS INFLUENCED BY THE PROCESS OF REAL-ESTATE DEVELOPMENT

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

AND RESEARCH IN PARTIAL FULFILMENT

OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF ARTS

DEPARTMENT OF GEOGRAPHY

EDMONTON, ALBERTA

FALL, 1976

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Rural Residential Subdivision in Parkland County, Alberta: An analysis of the interrelations between environmental factors, location, and land values, as influenced by the process of real-estate development submitted by James M. Mukasa in partial fulfilment of the requirements for the degree of Master of Arts.

ABSTRACT

The issue of rural land subdivision and rising land values in the urban periphery is complex. On one hand, there are the parties concerned; these include farmers, municipal authorities, counties, the Provincial government, various land dealers, and lot buyers. On the other hand, there is the land to be subdivided which is constrained by geographical, environmental, and ecological factors. Both the parties concerned, and the specific constraints outlined above have a direct influence on the escalation of land values in the urban periphery. The influence which each of these has on rural residential land values is analysed and its impact is established.

The study area is located in Central Alberta, in the County of Parkland. The data used in the study are obtained from unpublished sources.

The analysis was carried out in two stages. First, the selected geographical factors were analysed using various statistical models (regression, analysis of variance, and chi-square). The influence of the main participants in rural land trade was established using less rigorous methods and models which were purposely designed for this study. The factors which lead to leap-frog sprawl in the study area are identified.

The analyses revealed that accessibility variables are not the main factors in explaining rural land values in the study area. Indeed,

within the study area, the unit value of land was found to increase slightly with increasing distance from the City of Edmonton and from the main routes leading to Edmonton. Four factors were found to have influence on land values: lot size, topography, proximity to open water, and soil types. Land speculators, i.e., those who buy and sell parcels of land suitable for subdivision but who do not develop the parcels, appear to play an insignificant role in escalation of rural land values. Developers, on the other hand, appear to play a significant role in bringing about increase in the value of land in urban periphery.

It was also proposed that a policy based on public ownership of land will reduce the rate at which the land values escalate in the urban periphery.

ACKNOWLEDGEMENTS

The writer takes this opportunity to thank the Canadian International Development Agency under whose auspices he has pursued postgraduate studies at the University of Alberta. The same gratitude is conveyed to the department of Town and Regional Planning, Kampala for granting the writer a study leave in order to complete his studies in Canada. Many people have contributed to this study and to all these the writer conveys his sincere appreciation.

Special gratitude goes to the following people. Mr. Walter Joneson, the County Assessor, at Parkland County headquarters for his tireless provision of information, and explanations concerning the intricate mechanism of land trade. The same gratitude is conveyed to Keith Toogood of the Provincial Ministry of Agriculture, David R. Erickson of Melton Real-Estate Company, and L. Diemer of Edmonton Regional Planning Commission for detailed information they provided during the initial stages of the study. I am grateful to my typist, Ruth Prostebby, for the long hours she spent on the thesis even at a time when attention to her family was demanding.

Finally to my advisers Dr. O.F. Sitwell, and Dr. R.A. Pendergast whose constructive criticisms acted as academic guidelines right up to the end of the study.

The writer takes full responsibility for any errors that may be observed in this study.

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CHAPTER I

INTRODUCTION

The thesis deals with the influence of (1) selected geographical factors and (2) land subdivision for country residential purposes, on land values in Parkland County, Alberta. Land subdivision for country residential purposes is a controversial issue among the parties concerned, with the following conflicting points of view being found.

(i) The owners of the residential property in the area do not like the area to be too-much subdivided, because intensive land use will lower property value.

(ii) Naturalists would like to preserve environmental quality and stabilisation of sand dunes: for example in Parkland County.

(iii) The farmers would like to make more money by selling unproductive parcels of land and to be free to sell to anyone.

(iv) The County of Parkland would wish to see as high a level of subdivision as possible as this would maximize taxation as land is put to higher use.

(v) The province wants to preserve rich agricultural land.

(iv) There is a great demand for country residential lots within easy reach of the city of Edmonton.

However land subdivision particularly in Parkland County is subjected to severe geographical, ecological, and physical constraints.

(1) Geographical

A substantial area which is otherwise suitable is liable to flooding.

(2) Ecological

Removal of vegetation will reactivate sand dunes.

(3) Physical

A high water-table permits unwanted horizontal dispersal of sewage. Leakages in septic tanks are likely to contaminate the ground water, which is the main source of supply to the households.

Despite the constraints mentioned above, the desire for a rural way of living and rising land values are clearly indicated in the rising number of subdivisions and the rise in assessed land value which is based on market value.

(1) The first section of the thesis deals with the influence of selected geographical factors on the location of country residential areas and associated land values. The areas in question are those commonly referred to as subdivisions, i.e. units of land of eight hectares (twenty acres) or more in size which are subdivided after purchase into four or more lots, each of which is used as the site for residences. The geographical factors considered are (1) size of the

lot the buyer can acquire, (2) accessibility to Edmonton, (3) accessibility to the main highways that cross the study area, and (4) the suitability of the land for the potential uses which actually exist (i.e. the uses considered by the Edmonton Regional Planning Commission which has overall responsibility for planning in the study area).

(2) The second section of the thesis focuses on the relationship which land values have to one another at successive stages of the process of development. The stages are (1) when used for farming, (2) when made available for sale by the farmer to a developer, (3) at the time of subsequent sale when the lots are sold to individual buyers. In this section a distinction is made between two types of buyers. On the one hand is the individual or company who sells the lots in the subdivision to individuals; such a person or company is referred to as a developer. Then there is an individual or a company who sells the subdivision as a whole. Such an individual or company is referred to as a speculator. In this section the size of the increments in the values at successive stages is identified and analysed.

The Study Area

Location The county of Parkland is situated adjacent to the western boundary of the city of Edmonton. It covers an area of 3774 square kilometres (1453 square miles) with its extreme western point being 93.3 kilometres (58 miles) from the city of Edmonton (see Figure 2.1).

Since the western end of the county lies beyond the convenient commuting range from Edmonton it will be excluded from the study. Specifically the area will coincide with that indicated in Figure 2.1 because most of the subdivisions for country residential use are located in that area.

Reasons for choosing the area

1) The area has experienced intensive subdivision for country residential purposes. This is indicated in an Edmonton Regional Planning Commission Technical Report where it is stated that, "as of 1974 the County of Parkland has taken the lead ahead of all other rural municipalities in Edmonton Regional Planning Commission with regard to country residential subdivision activities in the last few years". (Alberta Land Use Forum, 1974). The many subdivisions provide an adequate volume of data for the analysis undertaken here.

2) There are two already completed studies on Parkland which provide a foundation for the thesis. The two studies are: Country Residential Survey Parkland County: Technical Report No. 4A prepared by Edmonton Regional Planning Commission for Alberta Land Use Forum (1974), and Outline Plan, Township 51 Range 26 by Edmonton Regional Planning Commission, (1973).

3) The major constraints on country residential land use such as soil types, location on the fringes of the city, and accessibility to highways are clearly represented in the study area. The variation

in topography, the presence of woodland, and of many small lakes in the study area are some of the amenities which influence country residential subdivision. Such variation in scenery is not so common in other counties surrounding the city of Edmonton.

4) The E.R.P.C. regulations for subdivision allows lots between 1.2 and 8 hectares (3 and 20 acres) to be considered, whereas in some counties permission is only granted for lots of more than 16 hectares (40 acres) eg. the Municipal District of Sturgeon which has strict rules for subdivision.

Limitation of the study area

According to Technical Report No. 4A (Alberta Land Use Forum, 1974), the majority of people who own country residential property in Parkland County, work in the city of Edmonton. The maximum distance they are willing to travel to work is indicated by the 60-minute isochrone. Range 2 west of the 5th meridian is considered as the western boundary of the study area because it lies close to the 60-minute isochrone, and at the same time it avoids the possibility of any subdivision lying partly within and partly outside the study area.

In summary, the boundaries of the study area are as follows. The western boundary of the city forms the eastern boundary of the study area. Range 2 west of the 5th meridian forms the western boundary of the study area. The northern and southern boundaries of the study area coincide with the county boundaries because much of the data is available on a county basis. By limiting the study to

one county, the problem of a possible lack of comparability in the data is avoided.

The Context of the Thesis

The context in which the thesis is set is identified in two ways. First, a review of literature concerned with the problem of land values in the urban periphery and methods used to predict land values is presented. The research presented in these studies provides the foundation on which this thesis rests. This is followed by an analysis of the term speculation, and the meanings attached to that term. The reason for doing this is that in almost every informal discussion of changing land values on the urban periphery, speculation emerges as a topic of controversy. It is obvious that the feelings held on this topic are strong, and it is also clear that, if some of the feelings are well founded, speculation plays a very important role in the escalation of land values. The purpose of the analysis is to provide a framework which will enable the probable impact of speculation and the increment in the value of land in the study area which has been bought for subdivision in recent years to be identified.

Literature Review

The literature reviewed can be classified into four broad categories. First there are studies concerned with identifying in a general way, non-ecological factors which influence rural land values.

Second, there are studies in which models are used to predict land values at specific areas and the influence of land speculation on land values. The third category consists of the relationship between urban sprawl, land speculation, and land values, and of the views held on these matters. The fourth category contains studies of rural land value in the Edmonton Region.

Non-ecological factors

Vernon W. Ruttan(1961), in his study of the influence of industrial plants on rural land values, realised that there was an association between the location of industrial plants and an increase in rural population. The growth in population eventually led to a rise in rural land values as the rising population created demand for rural land to be used for residential purposes. This view was supported by T. Rancich(1970) in his study at the Green Valley, California. In his research it was shown that the construction of a Boeing plant in 1964 led to an inflation in land values in the surrounding region. He attributed raising land costs to the gains which buyers expected to make because the construction of the factory was to be accompanied by the construction of a rail corridor and a freeway. Both of these would greatly increase the accessibility of the area. He also showed that the construction of a dam in the upper valley established confidence which helped to push property values upwards.

Accessibility has been cited by rural land researchers as one of the main factors contributing to increases in rural land values.

H.B.Schechter(1961) attributed rising land values on the urban periphery to accessibility. The same view was held by Robert D. Waldo (1974). In his study of the Saint Gabriel valley in Los Angeles, Waldo asserted that accessibility in the form of improved transportation to the main urban centres was the main influence on land values in that area. However Garner and Yates (1971: p.251) are cautious about accepting too readily the view that accessibility is the main determinant of suburban land values. In their study of land values in Chicago they found that accessibility was no longer vital in 1960 in determining land values as it had been in 1910.

It seems then that the case is unsettled, and there is apparently no consensus at present as to why accessibility appears to be a significant determinant of land values in some instances but not in the others.

Land value models

Some researchers have tried to go beyond the simple identification of factors influencing land values, and have sought to construct models which would make accurate prediction of values possible. Several of these researchers have used statistical techniques of regression analysis, in effect, as a model for their models. They have postulated that land value is determined in a measureable way by one or more elements present in or related to the land, moreover, by using regression analysis as the technique for relating the dependent variable, land value, to the independent, they have postulated that the

variables behave in a way which corresponds to the behaviour specified in the mathematical theory of regression and correlation (Blalock 1960, chapters 17,18).

Some of the problems involved in these assumptions will be dealt with in the section on methodology which follows later in this chapter. Here it is sufficient to say that, unless specified otherwise, one of the assumptions made is that the behaviour of the variables can be measured on a ratio scale (Blalock, 1960, p. 15). On the face of it, this would preclude the use of data measured on nominal or ordinal scales. As we shall see, however, some researchers have tried to get around this limitation by the use of what are called dummy variables (Smillie, 1965).

Garner and yates (1971) used distance and locational variables to predict land value at any location in Chicago. Duane S. Knos (1967, p. 262) expressed land values in terms of distance, growth of population, and growth of the city size. James Munger(1964) made an attempt to measure the effects of on-site and off-site components of rural land values using a multiple regression model. The two rural components he used were (a) lake shore property, and (b) open country land property. He found out that adjacency to lakes had a dominant effect upon rural land prices in the study area. Michael Goldberg (1970) predicted rural land values using three economic variables. The economic variables used in his regression model were (1) per capita income, (2) population density, and (3) value of agricultural

products. In his paper he also indicated the effect of improved transportation and governmental designated recreation areas on rural land values.

The inclusion of agricultural products as a main variable in determining rural land values has recently been disputed. Wise and Dever (1974) indicated the growing weakness of the classical economic rent theory in interpreting rural land values.

> As more uses for forestland and farmland develop, forest and agricultural factors diminish in importance as a price explainer. These factors become incidental to price instead of being primary determinants. Rather, locational factors, property amenity and direction of growth become dominant forces in influencing land market decision. (p. 103)

They admitted that there was an unstable price relationship among the variables used in their regression model, as indicated by standard errors in the analysis. This was so, they argued because there are a number of forces (e.g. motivation to sell) operating in the land market which are not easy to explain. Wendt and Goldner (1966) found that land values tend to neglect the "flat plain" approach. The pattern of land values tend to respond to spatial pull of other centres rather than to the Central Business District. The spatial pulls identified were, (1) potential accessibility to other centres (shopping centres, industrial parks, etc.), (2) potential availibility of jobs in other centres, (3) variation in topography, and (4) socio-economic factors. Such spatial pull results in differing patterns of land values.

Asanti (1974) in his study of "the incidence of rural property taxation in Alberta" stated that,

> In a study of equity of rural property taxation, it is important that factors affecting farm real estate prices be investigated. (p. 6)

He used a regression model in which rural land value per acre was expressed as a function of economic variables, and urban influence variables. The economic variables were (1) actual property tax rate per 1,000 dollars assessed value by municipalities, (2) value of agricultural products per acre in dollars by municipality, 1970, and (3) net addition of outstanding Federal Credit Corporation loans in dollars, 1970-71 financial year. The urban influence variables were entered into the model as dummy variables, and were treated in the following way:

(1) dummy variable for municipalities off the Edmonton-Calgary Corridor and (2) percentage change in [rural] population from 1961 to 1971 by municipalities.

Finally, there are two other studies which are probably the most interesting of all. Howard A. Clonts (1970) used the distance variables, size of parcels, road conditions, drainage, and topography as the main variables in his regression model. He found that urbanization was the main source of increases in rural residential values. Because of the expected use of the land, the value per acre of residential land without buildings was twice that of agricultural land. Leroy I. Hushak (1975) established a price model for rural land. He used

distance variables, zoning, location, tax, lot size, and amenity as the explanatory variables for the price per acre at any given location.

With the exception of the studies by Clonts and Hushak, the models mentioned earlier have one specific weakness. They indicated the value of land at a specific location, but they provide no information on the size of the parcel of land which has the specified value. In this study, following Clonts and Hushak, the size of the parcels being used is considered as a variable that influences the value of the land.

Land speculation, urban sprawl, and land values

The problem of rising rural land values cannot be treated independently of such issues as urban sprawl, and the role of speculation. According to Clawson (1962), it is the ineffectiveness of agriculture which has caused inflated rural land values and urban sprawl. While urbanisation has been able to influence rural land values, agriculture has not succeeded in influencing urban land values. This view differs from that held by Clark and Harvey (1965, p.3) that "it is lack of coordination of the decision to speculate which produces urban sprawl and not speculation itself". The views presented above are illustrations of the controversy surrounding the topic as a whole.

For the purpose of this review, the topic will be divided into the following groups:

Proponents of land speculation C.E. Elias (1965), compared a land speculator to a speculator in other commodities such as wheat. He

stated that a land speculator acquires land when it is in plentiful supply on the market, and then releases the land when the demand is high. By controlling the rate at which land is released, the speculator can keep the price high. If the speculator were to release all the land at one time, assuming that he had control over a large part of the supply, the result would be a significant fall in the price of land. Elias also pointed out that there is a power structure among speculators with the financially able ones being able to out bid the weaker ones. Thus speculators holding large pieces of land could induce orderly development. James Gillies (1965) in support of the view that land speculators have helped bring about orderly development, cited a number of what he called the "best developments" in the United States which have taken place in those areas where large scale speculators have been involved. By holding large pieces of land and releasing them on the market when land was required, speculators have participated in reducing violent price fluctuation and ensuring attractive communities.

> As a consequence of sound planning and controlling the rate of land availability by the speculator, violent price fluctuations in the land have been eliminated and attractive community's being built. (p. 795)

The development at Canejo valley was given as an ideal example of the type. A similar view was also observed in the southern side of Los Angeles Metropolitan region in Orange County. A corporation was alleged to own 90,000 acres (approximately one-fifth of the entire county). By regulating the land flow onto the market, orderly develop-

ment was achieved.

Yet another view was that of Clark and Harvey (1965) who considered lack of coordination to speculate as the prime cause of urban sprawl and not speculation itself. They argued that most of the profit goes to the developer and not to the speculator.

Opponents of land speculation Yearwood (1971, p. 31) maintained that land speculation can only be understood in the context of the following: (1) land use practices, (2) control over land uses, (3) public needs, and (4) popular attitudes concerning these matters. What this seems to imply is that the speculator, if he is well informed, can capitalize on land to obtain unearned increments. Yearwood disagreed with the view of "orderly development" as expressed by C. Elias (1965). He argued that it is not the speculator but the well informed developer, and in particular one who has large land holdings and can thus work on a large scale who can provide orderly development.

R.W. Bryant (1972, p. 160) referring to "Land Fever" in the suburb of the City of Perth, Australia, wrote as follows:

> [there are] wild increases in land prices, bearing no relation to normal process of supply and demand, enormous unearned increments for the owners able and willing to take advantage of the situation and so forth.

M.T. Rancich (1970), during his study at the Green valley in California found that the mere announcement of the location of the Boeing project in the valley induced non-agricultural individuals to buy 5,100 acres in the valley. In most cases land ownership changed hands

three times at ever-increasing prices.

Land subdivision in Edmonton region

Background It was considered proper for the purpose of this study to provide background information on the land subdivision process in the study area. The study reviewed for this purpose is that by Hassbring (1969). Although this study was more associated with the urban fringe zone which was then smaller than the current urban periphery, the study gives a picture of rural land subdivision development in the study area. Hassbring identified a growing non-urban population in rural areas as an indicator of the degree of urbanisation. The research revealed that the ratio of farm to non-farm population was 3.3/1.0 and 3.0/1.0 for Strathcona and Stony Plain respectively. According to Hassbring there are three factors which led to the urban-rural defusion of population.

(1) The fringe zone was considered as a healthier place in which to raise a family.

(2) Land prices were lower in the fringe zone than in the city.

(3) The improved transportation which would provide accessibility to Edmonton for people living in rural-urban fringe zone.

Similar views were also expressed by L.M. Diema (1974). Although rural land subdivision was then taking place, the "phenomena in the rural urban interface country resident subdivision" as defined by

Moncrieff and Phillips (1972, p. 80), was not yet in the making. Hassbring (1969, p. 99) observed the situation in Stony Plain as follows:

> The visual impact of urbanisation is much less in Stony Plain than in Strathcona East, even though these two sub areas have almost the same percentage distribution of rural and urban land use.

However, Hassbring was more sensitive to Stony Plain area as a potential area for country residential use.

> Scattered all over the whole area are various types of residences, and the general impression is that this is a popular tract in which to locate a country-home for families of above average economic circumstances. (p. 80)

Two years later, the situation visualised by Hassbring in her research was taking shape in the eastern part of the study area. The Edmonton Regional Planning Commission's report (1971) referred to the subdivision situation as follows:

> This County [Parkland] has experienced another major subdivision and development year particularly in the eastern part of this county which is closely linked to the Metropolitan area. (p. 7)

In the same year, a study of the development of subdivisions in township 51 range 26 west of the 4th meridian, was initiated. By 1972, the County of Parkland was leading other municipalities within the jurisdiction of the Edmonton Regional Planning Commission in the number of parcels processed for subdivision (Commission Report, 1972, p. 7). The County of Parkland has maintained that position since then. The process of subdivision was also accompanied by rising land values.

The position paper on the Edmonton-Calgary Corridor: Physical and Economic Characteristics, indicated that country residential use is the main factor which affects land values in the urban peripheries of the two metropolitan centres (Edmonton and Calgary) in Alberta. The position paper also asserted that soil capability rating and accessibility to major centres has been the primary cause of land speculation and inflation of agricultural real estate values in the area surrounding the two metropolitan centres.

The same view as above was indicated by R.J. Miller and G.R. White (1974, p. 31), that the desire to live on an acreage in areas near the city facilitates land speculation because "this influence exerts an upward pressure on the value of all real estate, particularly near large urban centres".

Land Speculation

Under this heading, attention is paid to the definition of a land speculator, in order to identify a land speculator using existing information and to identify areas of speculative activities.

Definition In the context of the thesis, a land speculator is defined as an individual or a company who owns a piece of land of more than 8 hectares (20 acres), (8 hectares (20 acres) is the maximum area accepted for a single residential unit in Parkland County) and fulfills the following conditions:

1) The owner does not derive his principle income from the land; that is, the owner has income other than agriculture, and in addition, that particular owner was not registered at the county assessor's office as a farmer.

2) The land owner referred to in (1) above bought the land from a farmer or from another individual and sold it to a developer without making any improvement on the land.

In case of (2) above, it is possible that more than one land speculator can be involved on one piece of land. According to the prestated conditions, a person registered as a farmer at the county assessor's office or any company registered as agricultural is not considered as being a speculator. This does not rule out speculation among farmers on rich agricultural land, who cannot, at present, expect to sell their land for residential purposes because of the planning regulations.

The type of land speculator considered in the thesis is the one who buys the rural land with the intention of obtaining monetary gain by reselling it to another speculator or directly to a developer. Farmers can sell their land to a developer, but there is no way of investigating their attitude because they are simply selling their basic property which in the law is their principle source of income. (According to law, farmers are required to take an oath in the court of law to confirm that their prime source of income is agriculture.)

Method of identifying a speculator

Identification of speculators required taking the following steps.

(1) Identification of names and occupation of owners of the subdivisions as they appeared on the county ownership-map in 1969. That year is considered as a starting point because most of the subdivisions into residential lots took place in the early 1970's.

(2) Identification of owners who submitted applications for division of land into residential lots.

From (1) and (2) above the following conclusion can be derived:

(1) If the name of the owner who submitted application for subdivision into residential lots differs from that indicated on the county ownership-map (1969), and the owner of the subdivision in 1969 was not identified at the county assessor's office as being a farmer, then the owner of the subdivision in 1969 is considered as a land speculator. The same definition will be applied to any nonagricultural owner who bought the land after 1969 but did not submit an application for subdivision, and instead sold the land to a developer. By this definition a farmer can be a developer and there are examples of such transactions in Parkland County.

Identification of areas of speculation

The areas where land speculation has taken place in the past, will be called speculative areas and will be identified on maps at the quarter section level (Figure 3.2, p. 86).

The Impact of High Land Values

Another point which must be born in mind is concerned with the question of who benefits from high land values and speculation, and who is adversly affected. The beneficiaries include the following:

(i) The farmer who sells unproductive land at a higher price than that indicated by the assessed value of the land (in Parkland County the top value of farmland per acre is 400 dollars).

(ii) The speculator who succeeds in selling land at a higher value without investing in improvements.

(iii) The County, which gains from high land values because the assessed value on which the mill rate is applied to get tax on land is based on market value. Although there is a widely accepted view that scattered subdivisions make provision of services expensive, it is evident that the County offsets such costs by adjusting mill rates on land and improvements.

(iv) It is also possible for the community at large to benefit. James Gillies (1965) indicated that speculators who own vast tracts of land are responsible for major successful and orderly developments in the United States. He gave an example of Canejo Valley, California as one of the "finest developments" in the United States.

Those who are adversely affected are:

(i) Those responsible for planning development. They suffer because high land values and speculation cause leap-frog sprawl. Although J. Gilles (1965) supported land speculation, he did admit in the paper

that,

> Speculators holding large parcels have set up such high sales price that it is economically efficient for developers to move further out of the centre of the city and they cause some leap frogging in developments

Leap-frogging is a type of urban sprawl. In this type of sprawl it is difficult for planners to organise layouts for services. Construction of sewage disposal facilities becomes a crucial problem since the capacity of the plant and the nature of the pipes used depend on expected population to be served.

(ii) High land values are a burden to lot buyers, hence it becomes impossible for them to acquire the size of lot they would like to own.

(iii) People already resident in the area. Although taxation on land is low in suburbs compared to that of the inner city, taxation on residential land is higher in areas of high land values in suburbs since the assessed value is based on market value.

(iv) As a specific rural area is put to urban use, the neighbouring rural land experiences increase in value. The rise in value of the agricultural land is a problem for farmers since it makes it difficult for them to acquire more land for the expansion of their farms.

Methodology

The methods used in the course of this research are discussed in two stages, to correspond with the two sections of the thesis, as outlined in the introductory section of this chapter.

Geographical factors and land values

In the light of the findings of the previous research surveyed in the review of literature just presented, it was decided to investigate the relationship between the value of land chosen for residential development in the study area on the one hand and selected geographical variables on the other. As was stated in the introductory section above, the four variables in question are (1) the size of the lot the buyer can acquire, (2) accessibility to Edmonton, (3) accessibility to the main highways that cross the study area, (4) the suitability of the land for the uses to which it can be put as controlled by the Edmonton Regional Planning Commission.

While the first three of this set of four variables can each be identified by the use of a single measure, the fourth cannot. The reason a single measure cannot be used to identify the degree-of-suitability-of-land is that this "variable" is, in fact, the product of a number of separate factors. By drawing on two sources of information it was possible to identify three factors which contribute to the suitability of land for residential use. One source of information was the general body of research already examined, notably The Edmonton-Calgary Corridor (1974), with the addition of Zelmer et al. (1974). Another source was the officials of the County of Parkland who prepare the assessments of value with respect to the properties of the County. The three factors were (1) variation in terrain as measured by the slope of terrain and the frequency of change of slope, (2)

proximity to open bodies of water, (3) quality of the soil.

Once the variables which were to be investigated had been identified, a basic model of the relationship between land value, postulated to be the dependent variable, and the remaining or independent variables coul' be formulated. It takes the following form:

$$\underset{(c.r \text{ or } a.c.r)}{L.V} = f(x_1, x_2, x_3, x_4, x_5, x_6)$$

Where	L.V	=	Land value per hectare
	c.r	=	Country residential use
	a.c.r	=	Anticipated country residential use
	x_1	=	Average lot size
	x_2	=	Accessibility to main routes to Edmonton
	x_3	=	Accessibility to points of access to Edmonton
	x_4	=	Variation in terrain
	x_5	=	Proximity to water
	x_6	=	Soil types

This can be re-stated more specifically in the form of a regression model, as follows:

$$\underset{(c.r \text{ or } a.c.r)}{L.V} = f_1x_1 + f_2x_2 \ldots + f_6x_6$$

where the symbols have the same meanings as before.

Ideally, the data obtained in the study area could be used as input for the model. In that case the particular form of the equation, whose constants would represent the six functions of the independent

variables, would be obtained as output. Before such a procedure can be put into effect however, certain requirements of the regression model with respect to the nature of the data must be satisfied, and it happens that not all of these requirements could be met in the case of three of the independent variables. For this reason the analysis was divided into two stages. In the first, a regression model was used to express the relationship of the dependent to the independent variables in those cases where data with respect to the independents were available in parametric form (i.e. where the data could be measured on a ratio scale). In the second stage, where data were only available in non-parametric forms, less rigorous models were used. The models in question are those embodied statistically in the chi-square test and in the analysis of variance.

The regression model The variables for which parametric data were available were the size of the lot (x_1), accessibility to main roads leading to Edmonton (x_2), and accessibility to Edmonton (x_3).

For valid use the regression model requires that the variables be distributed normally and independently, and that they have equal standard deviations (Blalock 1969, chapter 17). With respect to normality, there seemed no reason to believe that the data depart seriously from this requirement. It was also assumed that the standard deviations of the variables remained constant throughout the range of observations.

Finally, it should be noted that the regression model assumes

that the data consists of a random sample drawn from a larger universe. In fact, in the summer of 1975, when the data for this study were being compiled, there were ninety-nine subdivisions in the study area which either had been or were in the process of being developed for residential purposes, and the data were collected with respect to all of them. Following Blalock, these subdivisions are conceptualized as belonging to "a hypothetical infinite 'universe of possibilities' " (1960, p. 270).

The regression model used the following form:

$$\underset{(c.r \text{ or } a.c.r)}{L.V} = a + f_1x_1 + f_2x_2 + f_3x_3$$

Where $\underset{(c.r \text{ or } a.c.r)}{L.V}$, x_1, x_2, x_3 are as indicated above (p. 23)

f_1 = change in value per hectare per hectare added to a lot

f_2 = change in average value per hectare per kilometre increase in the distance from the subdivision to the main highway leading to Edmonton

f_3 = change in average value per hectare per kilometre increase in the distance from the point of access to Edmonton along the main access route to the junction where the local road leading to the subdivision begins

a = constant term or initial cost per hectare.

Analysis of variance model The non-parametric variables could have been entered into the regression model as dummy variables, but this would not provide a clear illustration of the relationship between

each of the non-parametric variables, namely variation in terrain (x_4), proximity to water (x_5), and soil types (x_6), and the dependent variable (average value per hectare). Furthermore, those who support the use of dummy variables are also aware of the negative attitude held by researchers on this point (Daniel B. Suits 1968, p. 511).

For the purpose of analysis the two variables x_4 and x_6 mentioned above were analysed using analysis of variance. A subroutine One-way Anova was used. The main effects, the difference of mean, and the F ratio for each variable were established. In addition, the grand mean and deviations in each category were also established. This enabled the calculation of the mean values per hectare in each category which were used for further analysis. The method used to calculate the mean of each category is given by the expression below:

$$Vi = G + Di$$

where Vi = mean value in i^{th} category

G = grand mean

Di = deviation of the i^{th} category from the grand mean.

The unbiased partial correlation ratio (eta) was also calculated to show the relationship between the value per hectare and each of the independent variables (x_4 and x_6). Blalock gives the general form of eta (E) as follows:

$$E^2 = 1 - \frac{Vw}{Vt}$$

where Vw stands for the estimate of the variance within the categories, and Vt for the estimates of the total variance (Blalock, 1971, p. 267).

The Chi-square method The last variable to be tested was proximity to water (x_5). Subdivisions in the sample were divided into two groups: (1) proximity to water properties, and (2) away from water properties.

In addition to the statistical analysis, observation tours were also organised. The objective of the tours was to take a close look at the subdivisions and the conditions of roads connecting the subdivisions to the main access routes to Edmonton.

In some cases meetings and talks with farmers at auctions were conducted. This was done because farmers appear to know much about their surrounding area and also to compare the value of their farmland to that of the subdivisions. From the discussions, it appears that the farmers tend to base the value of their land on the value of the lots in a subdivision in their immediate vicinity. Farmers also appear to lose their knowledge about a subdivision once it is occupied by residents.

Land Values at Successive Stages of Development

The second part of the study deals mainly with the influence of subdivisions on land values. The emphasis in this part is directed to those areas subdivided for country residential purpose. In this case land values are considered under two groups.

(1) Subdivisions zoned for high density, i.e. where lots as small as three acres are permitted without restriction on the average size of the lots in the complete subdivision. These are called Type B subdivisions.

(2) Subdivisions zoned for low density use. In these subdivisions the average size of the lots must be at least fifteen acres though some individual lots may be less than fifteen acres in size. These are called Type A subdivisions.

The method used in the second part consists of the following steps.

(i) The identification of areas where farmland has changed to residential or anticipated residential use.

(ii) Establish the last value of the subdivision as assessed as farmland.

(iii) Establish the first assessed value of the parcels as assessed for subdivision.

(iv) Use the assessed value and the assessment formula to convert assessed values in both cases into farmland and country residential values.

(v) Find out the time of sales of the parcel, record the year and repeat for all subsequent sales up to the time when lots are sold to individuals for the purpose of constructing a residence.

(vi) Find out the time a permission for subdivision was granted.

(vii) If part of the original subdivision was sold to form a smaller subdivision, step (v) will be repeated for the resultant parts.

(viii) Find out whether the application for subdivision was lodged by the person who bought the parcel from the farmer or by another individual.

(ix) Establish the price paid for the subdivision at the time of each sale. The figures used are those on the records in the land titles office. This is actually the assurance fund value, but in ninety percent of the cases this is the sale price of the land. Convert the total price to price per hectare.

(x) Project the values indicated in paragraph (4) to the year the lots were sold using the cost of living index as an indicator of the increase in the value of the land.

(xi) Subtract the cost of improvement from the asking price after subdivision.

In normal situations where the land was bought by a developer, the difference between the value of total sales of the lots, and the asking price of the farmer plus the cost of the land improvements would indicate the profit obtained by a developer (though this will be reduced to an unknown degree by the costs the developer must bear in operating his business).

The diagram below shows the various asking prices and gains accrued to main participants in rural land trade.

Developer	Total asking price of the developer
	Cost of improvements
	Converted country residential value
Speculator	Speculator's gain
Farmer	Asking price of the farmer
	Converted farmland value

The difference between the asking price of the farmer and the converted assessed farmland value shows the profit obtained by a farmer.

A theoretical concept of some interest can be introduced here: it is the concept of value added by conversion. The difference between total asking price of the developer minus the cost of improvements and the projected converted farmland value, will show the value added by conversion.

The value added by conversion is a function of the following:

(1) Projected converted farmland value

(2) Cost of improvements

(3) Asking price of the developer

The difference between asking price of the farmer and the speculator indicates the profit obtained by the speculator.

Source of data

The data used in this study were collected primarily from the Assessors Office in the County of Parkland during the summer of 1975. The time was ideal for collecting data because an assessment

review took place in the previous year. This assessment review was the only one which had taken place since 1963. Land was assessed separately from improvements. The assessed value of the land was 27.4 percent of the market value. In order to assemble the total assessed value of each subdivision, the assessed value of every lot in a subdivision was added together. This was done because land for country residential use is assessed on an indiviaual lot basis. A total of two thousand two hundred and fifty lots as indicated on the assessment cards were examined. Every card indicated the following: The assessed residential value of the land, the use to which the lot is put, the structural improvements on the land, and lot owner's name. In this way it was easy to distinguish lots used for country residences from those used for multiple purposes and commercial activities in any given subdivision.

The assessment book, on the other hand, indicated the year in which the subdivision was divided into lots, the area covered by water, and the final assessed farmland value. In every case, soil category and terrain type were indicated on a quarter section basis.

The information and data about terrain categories, soil types, and proximity to water were checked using the following sources of information:

(i) Edmonton soil survey sheet (1969) and Wabamun Lake soil survey (1970) Published by Soil Research Council, Canada.

(ii) Aerial photographs

The Edmonton soil survey maps show the types of soil terrain for the entire study area.

Assurance fund values were extracted from discs and computer sheets provided by the Ministry of Natural Resources (Alberta).

Distances to the main access routes to Edmonton and distances to the points of access to Edmonton were measured using a Parkland County map (Scale 1" : 1 mile). For every one of the ninety nine subdivisions, the distance along the gravelled road and the distance to the point of access to Edmonton were established. In measuring the distance along the gravelled road, it was assumed that an individual would take the shortest route to the nearest main access route. In other words, the shortest distance to the nearest main access route to Edmonton was considered as the distance for the specific subdivision.

The potential area of each soil and terrain class was calculated using Edmonton soil survey sheet and the dot grid method (scale 1 dot: 2.6 hectares (6.4 acres)).

The information concerning land speculation was collected from two main sources:

(1) The County of Parkland land ownership map. The map indicates the names of those people who developed the subdivisions into residential lots.

(2) The land title books show the names of people who owned

land, the time they bought it, and the current owners of undeveloped lots in the subdivisions. Using these books made it possible to trace how land ownership changed hands and the dates at which the transactions were made.

Land speculation could be identified by comparing (1) and (2) above because a speculator is held to operate from the time the land is bought from the farmer until it is sold to the developer, whose name appears on the Parkland County land ownership map as indicated in (1) above.

CHAPTER II

THE LOCATION AND LAND VALUES OF RURAL RESIDENTIAL SUBDIVISIONS AS INFLUENCED BY SELECTED GEOGRAPHICAL FACTORS

In this chapter, the locational distribution of land in the study area which has been subdivided for residential purposes is examined with a view to discovering whether,

(1) land possessing certain geographical characteristics is more frequently used for residential purposes than land possessing a different set of geographical characteristics;

(2) variation in specified geographical characteristics result in some residential subdivisions having greater values per unit of area than do others.

The geographical characteristics which are considered are those which were identified in the introduction, that is (1) accessibility to Edmonton, (2) accessibility to the main highways which provide access to Edmonton, and (3) the suitability of the land for the uses which have been identified by the Edmonton Regional Planning Commission as being permitted within the study area. The characteristics which determine the suitability of the land are those of the form of the terrain, its edaphic qualities, and the presence or absence of open

water within the boundaries of a subdivision.

The chapter is divided into five sections. First, the policies of the Edmonton Regional Planning Commission with respect to the subdivision of land for residential purposes are discussed. Second, the characteristics which determine the suitability of the land for residential subdivision, including the factors of accessibility, are examined in detail. In the third section the relationship between the geographical characteristics of the land the the frequency of its use for residential subdivision are examined. The fourth section is devoted to an examination of the relationship between the geographical variables and the value of rural subdivisions per unit area. The fifth section contains a summary of the findings of the chapter.

Background to the Study Area

With the exception of townships in Range 2 West of the 5th meridian, the study area is part of the Edmonton periphery (Miller and Pattison 1973, p. 30). For the past four years, the County of Parkland, in which the study area is situated, has been leading other municipalities within the jurisdiction of the Edmonton Regional Planning Commission in the number of parcels processed for subdivision into residential lots. As far back as 1972, the Planning Commission indicated as follows:

> In 1972, the County emerged as the municipality having the greatest number of parcels processed from among all municipalities within the commission. The majority

> of these lots were those ranging from 3 to 20 acres in size (23rd Annual report 1972, p. 7)

Among the advantages which do make the County of Parkland suitable for country residential development is the character of the terrain (Zelmer et al., 1973, p. 11).

Table 2.1 provides an overall view of the country residential development in the study area

TABLE 2.1, AN OVERVIEW MATRIX OF LAND USE DEVELOPMENT IN THE STUDY AREA

Total area subdivided in Hectares (Acres)	Number of Subdivisions	Average size of subdivisions in Hectares (Acres)
4600.6 (11368)	99	46.4 (114.8)

Table 2.1 indicates that the average size of the subdivision is less than the standard quarter section (64.7 hectares (160 acres)). This is so because of the following reasons.

(1) Land used for multi-purposes was not included in the calculation because such land is assessed differently.

(2) Developers still own lots which they cannot sell due to their physical nature. Such lots are assessed as agricultural land until they are sold to a user.

(3) It was also observed that there are lots in subdivisions which

are still in agricultural use. They are shown on assessment cards after the owner has indicated in a court of law that the principle source of income is provided by that piece of land. Such land was excluded from country residential acreage.

Table 2.2 shows the mean and standard deviations of both the dependent variables, value per hectare (Y) and the independent variables. The first four variables indicated in table 2.2 are used in the regression model. It will be noticed that all the standard deviations are large relative to the means, particularly so in the case of the depandent variable (value per hectare). This implies that the assumption of normality has been violated. In consequence, the findings derived from the model must be treated with caution.

TABLE 2.2 MAIN CHARACTERISTICS OF PARAMETRIC VARIABLES

Variable list	mean	standard deviation	number of cases
Value per hectare (Y) in dollars	1301	1385.5	99
Lot size (X1) hectares (acres)	2.5 (6.1)	2.3 (5.6)	99
Distance to the main road to Edmonton (X2) kilometres (miles)	4.8 (3.0)	3.2 (2)	99
Distance to Edmonton (X3)	18.5 (11.5)	12 (7.4)	99
Number of lots per subdivision	23	14	99

The Policies of Edmonton Regional Planning Commission

The planning policy in the study area is administered by the Provincial Planning Board through the Edmonton Regional Planning Commission. For the purpose of guiding development and policy administration, country residential development is grouped into two categories. Category A includes those lots in a subdivision whose size is between 3 and 8 hectares (7 and 20 acres). Category B is composed of lot sizes between 1.2 and 2 hectares (3 to 6 acres). The Regional Planning Commission controls development of each category and preserves agricultural land through "Rural Land Use Policy". Section 4a.2 which deals with subdivisions in category A is as follows:

> Land having prime agricultural capability rating should not be taken for country residential A use unless it is shown to the satisfaction of the Commission that the parcel concerned is not a viable unit for agriculture. (1975, p. 29)

Section 4b.1 of the Rural Land Use Policy indicates land on which category B use can be accepted as follows:

> Land with the poorer capability ratings for agriculture (excluding class "O") shall be preferred to those of better capability and, in no case shall land of capability better than 'class 3 with admixture of class 4 or poorer' be taken (1975, p. 30).

The Commission uses the word capability in the sense it was used in the Canada Land Inventory, capability for agricultural ratings. According to the Rural Land Use Policy, land with an agricultural capability rating of classes 1, 2, or 3 cannot be used for country

residence B. The Commission also indicates in the policy what type of land should be subdivided for country residential use.

> Land with partial or full cover of standing trees is preferable to completely cleared land. (1975, p.30)

However the Commission undertook this resolution in consultation with country residential owners.

> " . . . and many country residence owners have indicated a strong preference to timbered land, which adds a feeling of rural environment." (1975, p. 29)

Under section 4c of the Policy, the Commission requires that country residences be so located that they are:

(a) at least a distance of 3.2 kilometres (2 miles) from the city boundary
(b) at least 0.8 kilometres (0.5 miles) from the highway.

In conclusion, there are two things to be remembered. First, the Planning Commission under subdivisions regulation act can reject or accept the subdivision of land into residential lots. Second, though the rural land use policy became a public document in 1975, this does not rule out its being followed when it was in a confidential form and this may have affected land values in the study area.

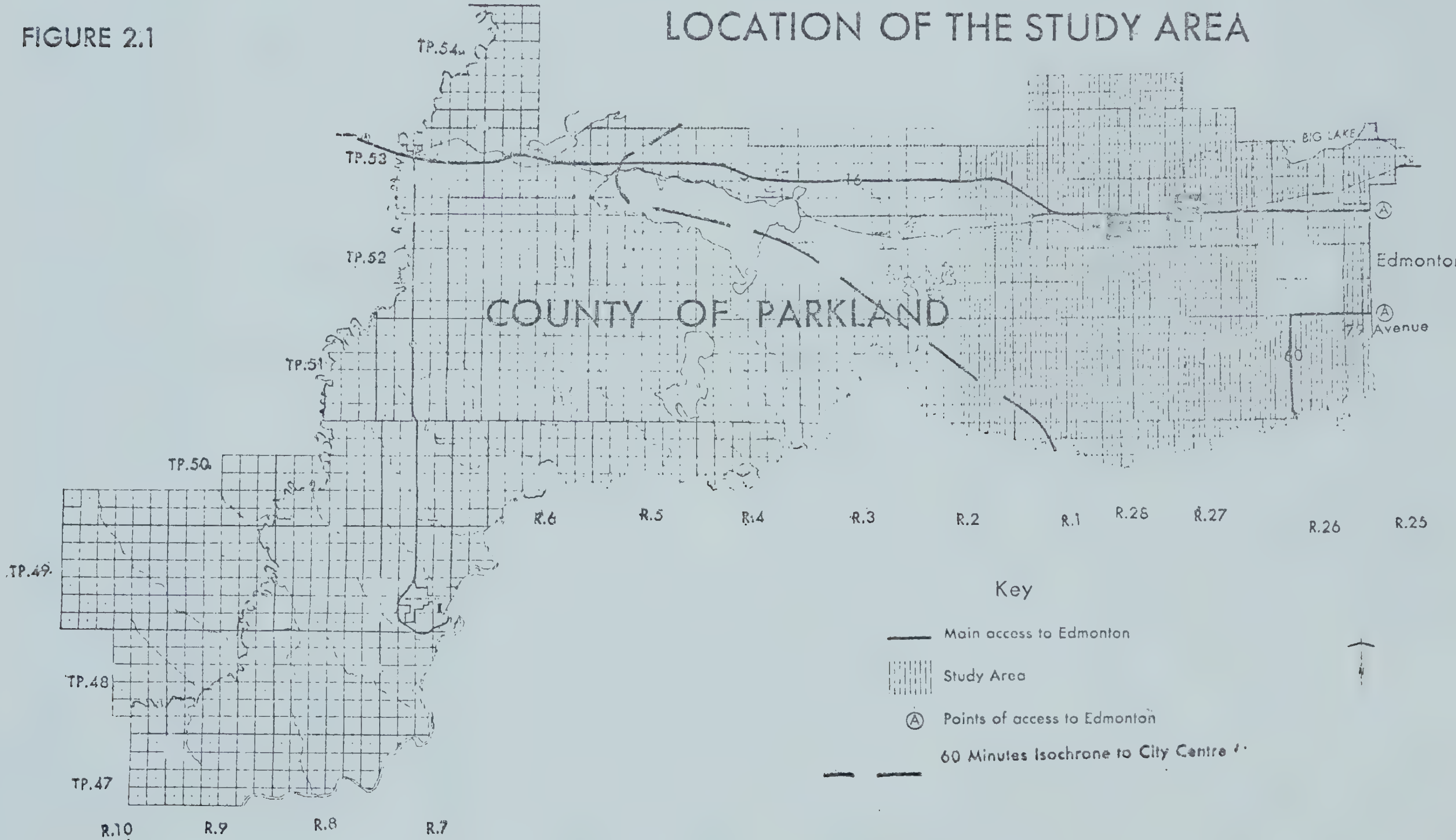
The Characteristics of Accessibility, Soil, and Terrain

Accessibility

Accessibility to Edmonton is of vital importance because the previous study on country residential use in Parkland County indicated that the majority of those who own country residences work in the city

FIGURE 2.1

LOCATION OF THE STUDY AREA



of Edmonton.

The operational definition of accessibility for the purpose of this study is as follows: It is the ability of the individuals to move from their residences located on subdivisions to (1) the main urban routes (Figure 2.1), and (2) by way of those routes to the city boundary, taking into account both the time and physical distances.

There are two urban access routes in the study area, (1) Highway 16 West between the city boundary and range 2 west of the 5th meridian, (2) The section of Highway 60 between the southern county boundary and the intersection with the western extension of 79th Avenue, plus the western extension of 79th Avenue from the city boundary to Highway 60 (Figure 2.1).

H.L. Diemer (1974) also considered in his study the western gravelled extension of 118th Avenue as an urban access route. This route was not considered in this study for two reasons: (1) This route and Highway 16 West are only 2 miles apart. In most cases an individual would prefer to travel to the highway and save time rather than travel on the gravelled road. (2) There are few subdivisions in the area where that avenue passes. It appears that particular road serves farms rather than country residences.

Accessibility to Edmonton is considered as being possible at two points: (1) the intersection of Highway 16 West and the city boundary, and (2) the intersection of the westward continuation of 79th Avenue and the city boundary. These two intersections represent the

points of access. It might have been thought appropriate to consider the central business district as the point of access, but it seemed probable that many, perhaps a majority of the residents of the study area, would work at sites located between the city centre and the city's western boundary.

<u>Quality of the soil</u> There are two main reasons for considering soil types and quality.

a) If the soil has a low permeability capacity, i.e. less than two inches of water per hour, and that soil is located on a low lying or flat area, the area composed of such a type of soil is liable to spring flooding and may be swampy. Liability to flooding and swamps increases the cost of constructing a residence. Constructing a residence on such areas is expensive because capital investment is required either to drain the swamps or to provide trenches to ease the problems of spring floods. The wide occurrence of organic soils and seasonal flooding in the study area, leads to a large number of unbuildable lots in various subdivisions (Zelmer et al., 1973, p. 11).

b) If the soil is water-logged, the construction and maintenance of the basement becomes difficult. The difficulty is mainly due to water in the subsoil finding its way into the basement through the cracks in sinking walls. The basement is important because, in the life style of a country residence, most of the people who own residences make frequent use of rooms in the basement, for

example for recreation, as well as for other activities.

The soil types in the study area can be classified into five categories.

(1) Chernozemic soils

(2) Solonetizic soils

(3) Podzolic soils

(4) Gleysolic soils

(5) Organic soils

For the purpose of this study, the soil series in each soil category was assigned an index for identification. Table 2.3 shows the soil type, indexes, and the soil series in each category that has experienced residential use.

TABLE 2.3 THE INDEXES OF SOIL SERIES BASED ON AGRICULTURAL PRODUCTIVE ABILITY

Soil types	Index	Soil series
Chernozemic	02	Eluviated black
	03	Orthic dark grey
Solonetzic	06	Solonetzic black
Podzolic	07	Orthic gray lovisol
	08	Dark grey lovisol
Gleysolic	10	Gleysolic soils
Organic	11	Sedge and moss peat

The soil series identified in Table 2.3 have the following characteristics in common.

(1) They were formed as a result of the pleistocene laurentide ice sheet which covered the entire study area during that era.

(2) Glacial deposits have been subjected to post glacial sorting. Bowser and Kjearsgaard(1962) indicated that the presence of local areas of lacustrine, alluvial, and aeolian deposits is due to this post glacial sorting.

> Some of the material in these areas is relatively local in origin, material that has been washed or otherwise carried down from the adjacent till. (p. 17)

Characteristics of soil series

Chernozemic soil There are two soil series in the chernozemic category which have been used for country residential development. Eluviated black (02), is basically rich in ph value (greater than 6) for the top layers except that the productivity rate has been reduced by over-farming. The soil has a medium to high water storage capacity and moderate permeability. It is well drained with good to excellent productive ability. Orthic dark grey (03) is rich in plant food stuffs, and well-drained. Water storage ranges from medium to high, and has a good to very good productive ability.

Black solonetzic soil (06), has water storage capacity between medium and high, very low permeability for top soils and subsoil, poor to fair productive ability.

Podzolic soil This soil is composed of two following series. First, the Orthic gray lovisol (07). According to Bowser and Kjearsgaard (1962) this type of soil series is mainly characterised by a leaf mat highly rich in ph value but underlaid by hard structured subsoil . The water storage capacity is medium to low, and both top soils and subsoils are well drained. It has an excellent natural drainage and very poor productive ability. Second, the Dark grey lovisol (08), which has the same characteristics as (07) with exception of the following: (1) it has an additional layer of soil below the leafmat; (2) the water storage capacity is lower, and the permeability is higher than that of (07).

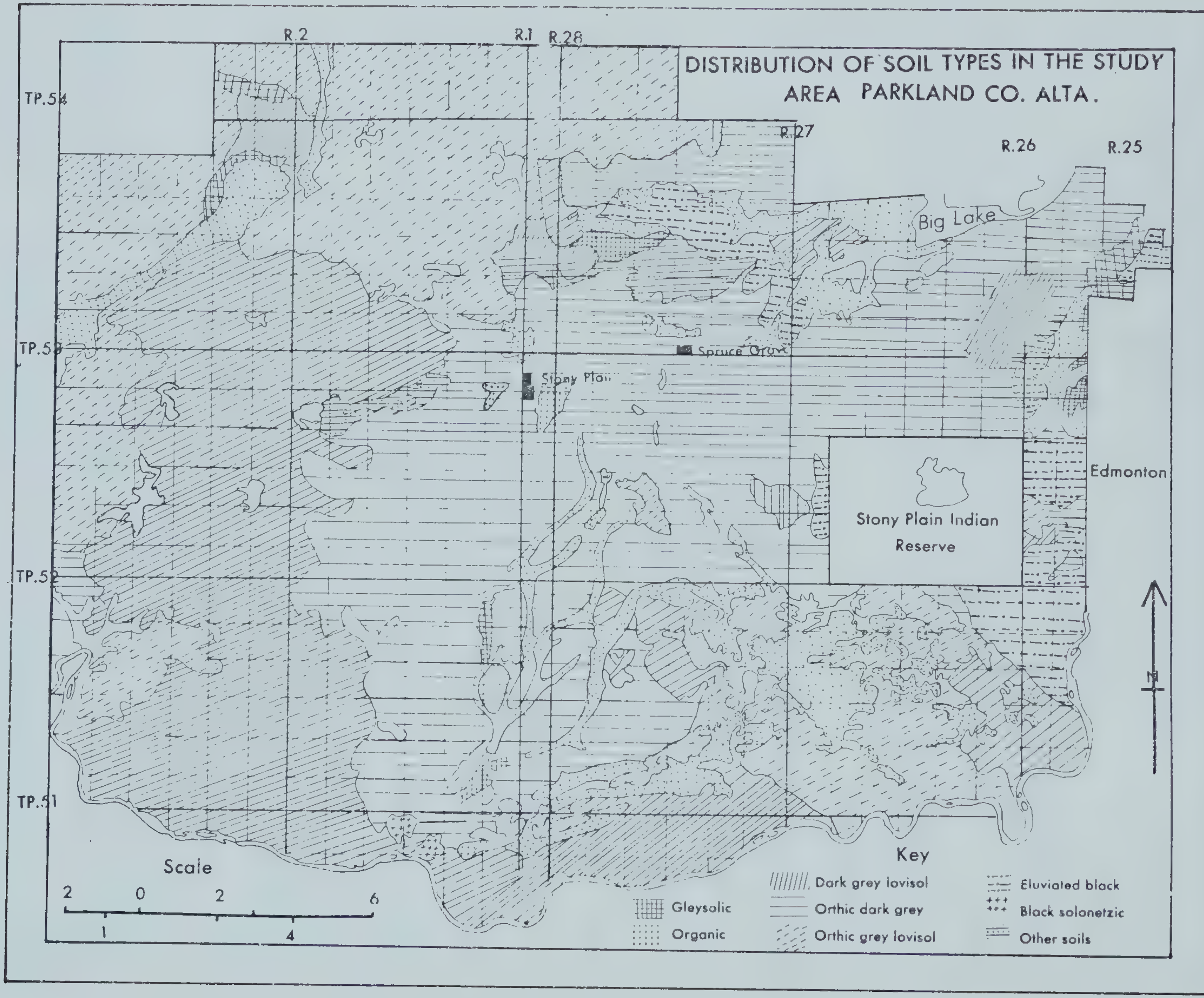
Gleysolic soil (10) The soil is basically very low in mineral content for supporting plants. It has a medium to high water storage capacity, poor permeability both for top and subsoils. The natural drainage is poor and productive ability is low.

Organic soil (11) Soils in this category include sedge and moss peats. The permeability of subsoils is high but the natural drainage is poor. The poor natural drainage for the subsoils is mainly due to sticky peat which reduces the permeability of water to lower layers of the soils. The productivity of organic soils is poor.

Distribution of the Soil Types

From Figure 2.2 a generalised discription of soil distribution can be given as follows:

FIGURE 2.2


DISTRIBUTION OF SOIL TYPES IN THE STUDY AREA PARKLAND CO. ALTA.
R.2
R.1
R.28
R.27
R.26
R.25
TP.54
TP.53
TP.52
TP.51
Big Lake
Spruce Grove
Stony Plain
Stony Plain Indian Reserve
Edmonton
N
Scale
2 1 0 2 4 6
Key
Dark grey lovisol
Orthic dark grey
Orthic grey lovisol
Gleysolic
Organic
Eluviated black
Black solonetzic
Other soils

Chernozemic soil is found in the following areas:

(1) The eastern part of Townships 51 and 52 Range 1 west of the 5th meridian.

(2) In Township 52 Range 25, 26, and 27 west of the 4th meridian.

(3) In isolated form in Township 51 Range 27 west of the 4th meridian.

(4) In Township 53 Range 26 and 27 west of the 4th meridian.

Podzolic soil is mainly found in the following locations:

(1) South eastern part of the study area.

(2) South east of Lake Yekaw.

(3) The area between the city boundary and the village of Winterburn.

(4) In Townships 51, 52, 53, and 54 Range 2 west of the 5th meridian.

Solonitzic soil is found in isolated form in Township 51 Range 1 west of the 5th meridian.

Gleysolic soil is scantily distributed in the following locations:

(1) Township 51 Range 1 west of the 5th meridian.

(2) Southwest section 12 and 13 in Township 52 Range 27 west of the 4th meridian.

Organic soil is mainly found in Township 51 Range 26 and 27 west of the 4th meridian. It also occurs in isolated patches in areas west of Big Lake.

Terrain

The main characteristics of the terrain were established using specific indicators based on slope percentages and soil type. Table 2.4 below indicates terrain ratings used in this study.

TABLE 2.4 TERRAIN RATING BASED ON SLOPE PERCENTAGES

Type of terrain	Index	Slope percentage	Rolls per half a mile
Flat to depressional	01	0	0
Gently sloping	02	0 to 1	2 or less
Undulating	03	1 to 3	2 or less
Gently rolling	05	3 to 8	3 or more
Rolling	06	8 to 15	3 or more
Strongly rolling	08	over 15	3 or more
Hilly	09	over 15	numerous

Source: Alberta Municipal Assessment Manuals.

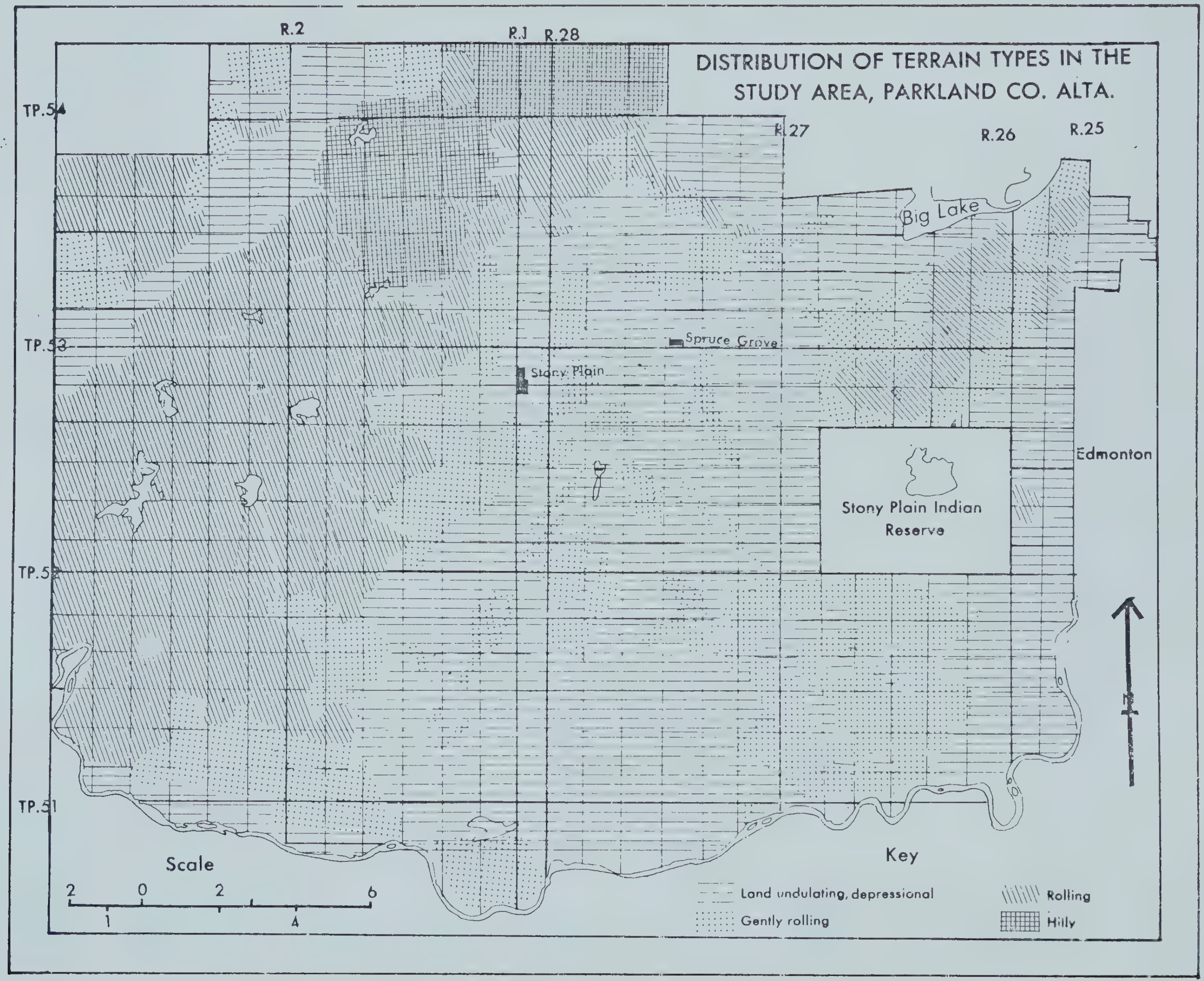
There are three points to observe in terrain rating.

(1) Terrain identification is mainly decided by examining the slope percentages, and the number of rolls per half a mile.

(2) In case where the criterion for the slope percentage is fulfilled but the number of rolls per ½ a mile is less than 3, an intervening category is inserted. There are two intervening categories, undulating to gently rolling (04), and rolling to strongly rolling (07).

(3) The terrain rating is based on a quarter section rather than a specific site rating.

FIGURE 2.3


DISTRIBUTION OF TERRAIN TYPES IN THE STUDY AREA, PARKLAND CO. ALTA.
R.2
R.1
R.28
R.27
R.26
R.25
TP.54
TP.53
TP.52
TP.51
Big Lake
Spruce Grove
Stony Plain
Stony Plain Indian Reserve
Edmonton
Scale
2
0
2
6
1
4
Key
Land undulating, depressional
Gently rolling
Rolling
Hilly

Distribution of types of terrain

According to Figure 2.3 terrain in the study area can be classified into four broad categories.

(1) Undulating to Depressional (categories 01 to 03). This type of terrain is mainly found in the central part of the study area, in the area between the city boundary and Range 25 in Townships 51 and 52 west of the 4th meridian. It is also found in Township 51 Range 1 west of the 5th meridian, and Township 51 Range 27 west of the 4th meridian.

(2) Gently rolling (categories 04 and 05), mainly found in Township 51 Range 26,27 west of the 4th meridian, and in isolated form in the central part, and in northeastern part of the study area.

(3) Rolling (categories 06 to 08) found in Townships 51, 52, and 53 Range 2 west of the 5th meridian, the western part of Township 52 Range 1 west of the 5th meridian, and in the northeastern section of the study area.

THE RELATIONSHIP BETWEEN GEOGRAPHICAL CHARACTERISTICS AND FREQUENCY OF USE FOR RESIDENTIAL SUBDIVISION

Table 2.5 below is intended to assess and analyse the potential of the study area to accomodate future residential development. The analysis is mainly based on soil series in each soil category.

TABLE 2.5 THE POTENTIAL LAND MATRIX OF THE STUDY AREA BASED ON SOIL SERIES

Soil indexes	Area available in hectares (acres)	Area used in hectares (acres)	Percentage used
02	4289.1 (10598.3)	127 (313.6)	3
03	40933 (101145)	632.9 (1563.8)	2
06	145 (358.1)	13 (32.1)	9
07	18564.2 (45872)	2193 (5418.9)	12
08	23610.8 (56902)	875.7 (2168.8)	4
10	755.9 (1867.9)	49.3 (121.8)	7
11	12297.4 (3038.9)	109.4 (270.3)	6
Total	100595.7 (248571.9)	4600.6 (11368)	5

See Table 2.3 for identification of codes.

According to table 2.5, there is a wide potential for accomodation of future country residential development in the study area. Even the most used soil (07) has had development take place in only 12 percent of its area. The overall percentage used is very small compared to large potential of the study area.

Table 2.6 indicates the matrix of land use for country residences based on grouped* terrain categories.

TABLE 2.6 POTENTIAL LAND MATRIX BASED ON MAJOR TERRAIN CATEGORIES

Categories of topography	Area available in hectares (acres)	Area used in hectares (acres)	Potential area in hectares (acres)	Percent-age used
01 to 03	49,451.3 (122144.7)	1622 (4007.9)	47829.3 (118138.3)	3
04 to 05	21045.5 (52003.3)	1069.6 (2641.9)	19975.9 (49340.4)	5
06 to 08	26849.8 (66345.8)	1592.4 (3934.8	25257.3 (69230.2)	6
09	752.1 (1858.2)	152.9 (377.8)	599.1 (1480.3)	20
Total	98098.2 (242402.3)	4437 (10963.8)	93661.8 (231438.4)	5

With the exception of terrain category (09) of which 20 percent of the available topography has been used, the categories in table 2.6 indicate very low percentages of each category used. In calculating the potential area based on grouped terrain types, the area covered by water was excluded, this led to differences in total area available as indicated in tables 2.5 and 2.6.

* Categories were grouped into the classes used on the Edmonton Soil Survey Sheet.

The overall percentage is relatively low compared to the area available in the study area for future country residential development. As in table 2.5 the low percentage used indicates a large potential for future country residential expansion in the area.

THE RELATIONSHIP BETWEEN GEOGRAPHICAL CHARACTERISTICS AND THE VALUE OF LAND IN RESIDENTIAL SUBDIVISIONS

The regression model

The hypothetical approach, as indicated in Chapter I, specifies that the value of the land in the study area can be expressed as a function between the average value per hectare and the geographical factors in the following way.

$$\underset{(c.r \text{ or } a.c.r)}{L.V} = f(x_1, x_2, x_3, x_4, x_5, x_6)$$

Where L.V (c.r or a.c.r) = Value per hectare in those areas used or anticipated to be used for country residences, measured in dollars.

x_1 = Average size of the lot, measured in hectares

x_2 = Accessibility to the main routes providing access to Edmonton, measured in kilometres.

x_3 = Accessibility to Edmonton, measured in kilometres

x_4 = Variation in terrain.

x_5 = Proximity to water

x_6 = Soil types.

The model developed for forecasting average value per hectare is indicated in the following form:

$$\underset{(c.r \text{ or } a.c.r)}{L.V} = a \pm f_1x_1 \pm f_2x_2 \pm f_3x_3$$

The presence of the plus or minus sign indicates that in the general model the variables can vary either directly or inversely with the value per hectare. The general model can be made more specific through the following analysis, which reveals the expected direction of the relationship.

The average size per lot is expected to be inversely related to the value per hectare because per unit increases in the size of the lot provide the owner with diminishing returns in the form of satisfaction. This relationship is expected to be indicated in the regression model by a negative sign for the coefficient of the variable x_1.

The expected sign for the coefficient of the variable x_2 is based on the assumption that individuals would compete for location near the main access routes to Edmonton. This is so because of two main reasons: (1) location near the main urban access routes would reduce the time cost and the travelling costs, and (2) the individuals are expected to minimise inconveniences due to obstacles like drifting snow by locating near the main access routes to Edmonton. The result of that would be the reduction in value per hectare as the distance from the main road increases. This relationship is expected to be indicated in the regression model by a negative sign of the coefficient of the variable x_2.

The expectation for the sign of the coefficient of the variable x_3

is based on the goegraphical concept that land values decrease with the distance from the city centre in accordance with the normal distance decay function. The average values per hectare of the residential subdivisions located near the city boundary were hypothesised to be higher than those of subdivisions located away from the city boundary. Such a relationship is expected to be indicated in the regression model by a negative sign of the coefficient of that variable.

The scattergrams prepared in the initial stages revealed two important characteristics:

(1) The relationship between the average value per hectare and the average lot size appeared to be basically linear, though it also seemed that there was a tendency for value per unit area to increase exponentially in the case of lots of less than one hectare. To establish whether this tendency was significant would have required a larger data base.

(2) The two distance variables showed a linear relationship with the average value per hectare. It was however relatively weak. (table 2.7)

The absence of any simple correlation coefficients in the rank of 0.2 and above between any of the three independent variables is a firm basis for concluding that the variables used in the analysis are independent of one another. Jae - on Kim (1975) indicated that problems of multi-colinearity occur when at least one pair of the coeficients in the correlation matrix is in the rank of 0.8 and above.

TABLE 2.7 THE CORRELATION MATRIX OF THE VARIAB[illegible] USED IN THE REGRESSION MODEL

	Land value per acre L.V (c.r or a.c.r)	Average lot size	Accessibility to the main road to Edmon.	Access[illegible] to Edmont[illegible]
L.V (c.r or a.c.r)	1	-0.36	-0.16	-0.0[illegible]
x_1		1	0.15	0.1[illegible]
x_2			1	0.04
x_3				1

In order to confirm the independence of the variables, partia[illegible] correlation coefficients were established. Table 2.8 (p. 57) shows the partial correlation coefficients.

Interpretation

The specific form of the regression relationship resulting [illegible] the use of the study-area data is as follows

$$L.V = 1460 - 202x_1 + 39x_2 + 8x_3$$

The sign for the coefficient of x_1 agreed with the expectatio[illegible] that land value per hectare decreases as the lot size increases. [illegible] is shown by the negative sign of the coefficient in the regressio[illegible]

The sign for coefficient of the variable x_2 is not what wa[illegible]

TABLE 2.8 THE MATRIX OF PARTIAL CORRELATION COEFFICIENTS

Variables entered	Partial coefficients	Degrees of freedom	Levels of significance
$r_{0,1.2,3}$	-0.34	95	0.001
$r_{0,2.1,3}$	0.09	95	0.01
$r_{0,3.1,2}$	0.08	95	0.10
$r_{1,2.3}$	0.10	95	0.10
$r_{1,3.2}$	--0.05	95	0.20
$r_{2,3.1}$	0.03	95	0.30

The index 0 represents the dependent variable value per hectare.

expected. The sign indicates an increase in the cost of land with respect to an increase in the distance from the main access routes leading to Edmonton.

The sign for the coefficient x_3 is not what is expected. The positive sign shows an increase in the value of land with respect to increase in distance from the points of access to Edmonton.

The behaviour of the distance variables, accessibility to the main access leading to Edmonton (x_2), and accessibility to Edmonton (x_3) is contrary to the prevailing view that the distance variables are inversely related to the value per unit of land. However it should be noted that this type of behaviour by the distance variables is becoming

increasingly common in geographical research. Duan S. Knos (1962) indicated that land values in Topeka varied inversely with the reciprocal of the distance (1) from the city centre, and (2) from the main access routes to the city. Garner and Yates (1971) found that the distance variables (accessibility) were no longer the main factors in deciding land values in Chicago as they had been in 1910. They also observed the phenomenon of rising land values in the urban peripheries. Perhaps this can be considered as a modification in the geographical concept of distance decay function.

There are three points which can be made, and which between them may explain the behaviour of the distance variables. First, there is the desire among individuals to preserve property value by locating away from the main access routes. Second, there is the County's rural land use policy which requires location of country residences at least half a mile from the highway, and at least two miles from the city boundary. If much of the land for which permission to subdivide can be obtained is far from the highway, and the city, then areas permitted for this type of use may experience high land values even if they are relatively less accessible. Last, Zelmer et al., (1974) indicated the desire among country residents to live in a "rural" environment with as much wild life as possible. This is likely to motivate location away from the main routes to Edmonton and away from Edmonton. The locational implications outlined above can lead to an increase in the land values of distant land. These three points

may be sufficient to reverse the postulation that land values vary inversely with the distance variables.

The model indicates that, if the three geographical factors are disregarded in determining land value, then the average value per hectare will be 1460 dollars. This value in dollars is equivalent to the constant term 'a' indicated in the general form of the regression model.

The value per hectare of the lots decreases by 202 dollars for every hectare that is added to the lot.

The average value per hectare of the residential land increases by 39 dollars for any increases in the distance of one kilometre from the main access routes to Edmonton.

Using the analogy applied above, the average value per hectare will increase by 8 dollars per increase of one kilometre from the point of access to Edmonton.

From the explanations above, it is deduced that the size of the lots is the main factor in determining country residential value. This conclusion is also supported by the observation that, as table 2.7 shows, size of the lot is the only one of the three independents which shows any significant degree of relationship with the dependent. The finding also agrees with the view found by Diemer (1974), that most of the people move to the country in order to acquire cheap but large space.

Analysis of Variance Model

The two geographical variables which were analysed using the analysis of variance model were, (1) variation in terrain, and (2) soil type.

In the case of each of these two variables a weak relationship with the average value per hectare was expected. This is so because it is hypothesised that among soil categories and terrain classes some are preferable to others and this would lead to higher values per hectare in subdivisions located on desirable terrain classes and soil types than in subdivisions located on less desirable ones. The unbiased correlation ratio (eta) is expected to be nearer to 0 than to 1. This is so because of the high level expected of the within estimates of variance, which are likely to influence the size of the unbiased correlation ratio (eta).

Table 2.9 shows the main statistics used in case of variable x_4 (variation in terrain).

TABLE 2.9 RESULTS OF ANALYSIS OF VARIANCE BETWEEN VALUE PER HECTARE AND VARIATION IN TERRAIN

Variable	Degrees of freedom	F ratio	Level of significance	Eta	Eta^2
x_4	92,6	0.64	0.6	.21	0.04

According to table 2.9, the relationship between the variation in terrain and the average value per hectare is as it was hypothesised. Variation in terrain accounts for four percent of the estimates of the total variance. The remaining ninety six percent is attributable to variation within the terrain categories in themselves.

TABLE 2.10 RESULTS OF ANALYSIS OF VARIANCE BETWEEN VALUE PER HECTARE AND SOIL TYPE

Variable	Degrees of freedom	F ratio	Level of significance	Eta	Eta^2
x_6	92,6	2.02	0.07	.34	.11

Table 2.10 shows soil class. This variable accounts for eleven percent of the total estimates of the variance. The remaining eighty nine percent is explained by variation within the soil classes.

Value

The concept of value as it was used here is relative in that it is intended to investigate among various terrain and soil class which ones had relatively higher value per hectare compared to the rest. The objective is to find out how the various terrain and soil class affect land values if the accessibility and proximity to water variables are disregarded.

Table 2.11 shows the variation in value per hectare based on soil class.

TABLE 2.11 VARIATION IN MEAN VALUE PER HECTARE BASED ON SOIL CLASS

Index of soil class	Grand mean dollars	Cost per hectare dollars	Difference between class and grand mean	Percentage deviation
02		2656	+1513	+132
03		1082	− 61	− 5
06		959	− 184	− 16
07	1143	912	− 231	− 20
08		1622	+ 479	+ 41
10		754	− 389	− 34
11		935	− 208	− 18

see table 2.3 for identification of indexes.

According to table 2.11, the most expensive subdivisions are located on eluviated black and on dark grey lovisol. The cheapest land was found in areas of orthic gray lovisol and of gleysolic soil.

It was also observed in the analysis that soils with relatively higher fertility were more expensive if considered in terms of value per hectare than poor ones. The chernozemic soil had an overall value $202 above the grand mean. Subdivisions located on podsolic soil had an overall value $28 below the grand mean.

Table 2.12 shows the grouped percentages of the soil type which are widely used for country residences in the study area.

TABLE 2.12 THE GROUPED PERCENTAGES OF MAJOR SOIL CLASS USED FOR COUNTRY RESIDENCES

Soil Class	Index of soil series	Grouped percentage above the grand mean
Chernozemic	02 03	18
Podzolic	07 08	-2.4

see table 2.3 for identification of indexes

Variation in terrain

Analysis based on variation in terrain is intended to show how various terrain categories affect land values of subdivisions located on them.

TABLE 2.13 VARIATION IN MEAN VALUE PER HECTARE BASED ON TERRAIN CATEGORY

Terrain index	Grand mean dollars	Cost per hectare dollars	Difference between category and grand mean	Percentage deviation
01		848	-245	-21
02		843	-300	-26
03	1143	1558	415	+36
04		1069	- 74	- 6
05		855	-288	-25
06		1349	206	+18
07		1349	206	+18
09		1527	384	+34

see table 2.4 for identification of indexes.

Table 2.13 indicates that subdivisions located on terrain with small slope percentages were cheaper in value per hectare than those located on terrain with higher slope percentages. Subdivisions located on terrain categories 06 to 09 have value per hectare ranging from 18 to 34 percent above the mean value per hectare. With the exception of category 03, the subdivisions located on the other terrain categories have an average value per hectare below the grand mean. The explanation for this low value is that most of the terrain categories between 01 to 05 inclusive are found on low lying areas and organic soil. Such areas may be covered with semipermanent water bodies or liable to hazards of flooding. This usually affects the price at which the developer can sell the land. The findings of this research is that the average value per hectare for those subdivisions located on the terrain categories 01 to 05, is lower than that of subdivisions with higher slope percentages.

Chi-square Model

The last variable to be analysed was proximity to water, as defined on pages 35-36. The chi-square test, and Goodman and Kruskal's tau method were used in the analysis.

Chi-square The chi-square test is used to establish and to test the significance of the variation in frequencies between proximity to water properties and away from water properties using the mean value per hectare as a criterion for separating the residential properties into two categories with respect to value. The chi-square is expected to

have a large value since the differences in the value per hectare between the proximity to water properties and away from water properties was hypothesised to be large (Blalock 1971, p. 213). The level of significance also is expected to be high because the difference of the products of the diagonals in the frequency matrix is 350, this would ensure high level of significance of chi-square (Blalock 1971, p. 217).

Goodman and Kruskal tau The measure tau devised by Goodman and Kruskal is used as "a measure of proportional reduction in errors" based on the use of proximity to water in predicting country residential value per hectare. This is in fact a measure of the relationship between the frequencies of the subdivisions based on the above mentioned criterion and the average value per hectare. A strong relationship between the average value per hectare and proximity to water variable is expected, since it was hypothesised that location near water influences country residential value per hectare.

Table 2.14 (p. 66) shows the results of the chi-square measure. The chi-square measure and the level of significance indicate proximity to water as an influential factor on country residential value per hectare. The value of chi-square is as big as it was expected, and level of significance is as high as predicted. It is also indicated in table 2.14 that only nineteen out of fifty four subdivisions located near water were above the mean value per hectare, yet the overall effect of proximity to water is remarkable. The explanation for such

TABLE 2.14 THE MATRIX OF FREQUENCIES FOR BOTH PROXIMITY TO WATER SUBDIVISIONS AND AWAY FROM WATER SUBDIVISIONS, AND CHI-SQUARE

Location	Subdivisions above average value per hectare	Subdivisions below average value per hectare	Number of cases	χ^2	Level of significance
Proximity to water	19	35	54	11.3	0.001
Away from water	9	36	45		
Number of cases	28	71	99		

influence is due to the quality of the environment itself. If a subdivision is located near a large lake, it can command higher land value per hectare than that located near a creek or a small marshy lake. The explanation outlined above can be extended to away from water subdivisions.

Table 2.15 (p. 67) indicates the results of the Goodman and Kruskal's tau method. The relationship is not as strong as it was expected, though a significant reduction in the error is indicated. Tau indicates that the error a geographer can make in forecasting country residential value per hectare can be reduced by 38.5 percent, if that forecasting is based on the knowledge of the overall average value

per hectare, and location of the subdivision either in proximity to water or not. The significant reduction in error of 38.5 percent confirms the results of chi-square measure that proximity to water has a significant effect on country residential value per hectare.

TABLE 2.15 THE MATRIX OF FREQUENCIES FOR BOTH PROXIMITY TO WATER AND AWAY FROM WATER SUBDIVISIONS, AND RESULTS OF GOODMAN AND KRUSKAL'S TAU

Location	Subdivisions above average value per hectare	Subdivisions below average value per hectare	Number of cases	Tau
Proximity to water	19	35	54	0.385
Away from water	9	36	45	
Number of cases	28	71	99	

Conclusion

The main hypothesis tested in this chapter is that land value per hectare for country residential use in Parkland County Alberta is influenced by the geographical variables indicated on page 22. The geographical variables were grouped into parametric and non-

parametric variables using statistical criteria. The parametric variables were analysed using a regression model. Among the parametric variables, the lot size x_1 indicated the highest influence on average value per hectare. Accessibility variables x_2 and x_3, did not show as much influence on the value per hectare as was hypothesised. The explanation for this is the willingness of the Edmontonians to locate anywhere in the urban periphery without much concern for relative accessibility within that area. Furthermore, the wide use of the automobile which makes Edmonton the leading city in terms of the average number of sutomobiles per person in North America clarifies the situation. The rural land use policy outlined at the beginning of this chapter may have an impact on accessibility variables.

Non-parametric variables consisted of variation in terrain, proximity to water, and soil type. These variables were analysed using analysis of variance and analysis of frequencies (Chi-square method). Both variation in terrain and type of soil explained small percentages in the variation in average residential value per hectare as indicated in tables 2.9 and 2.10.

The factor of proximity to bodies of open water was tested using the chi-square method, and Goodman and Kruskal's tau.

The analysis of variance revealed the following

(i) Subdivisions located on relatively fertile land were more expensive than those located on poor land.

(ii) Subdivisions located on strongly rolling and hilly areas were

more expensive if considered in terms of average value per hectare than those subdivisions located on flat land. According to terrain ratings people who select areas with high variation in terrain (3 rolls per half a mile) pay more money per hectare than those who develop on flat land.

The results of Chi-square model, and Goodman and Kruskal's tau revealed the following:

(1) The location of a subdivision suitable for country residential use near water has a significant influence on the value per hectare of the land (Table 2.14).

(2) The error in predicting the value of the land per hectare can be greatly reduced depending on the knowledge that a subdivision used or to be used for country residential purpose is located near water (Table 2.15).

<u>What is the degree of applicability of the model?</u>

Although the study uses only data on land values in areas which have experienced country residential use in Parkland County Alberta, the model used in it is a quite general one which could be used in other studies concerned with country residential use. The variables x_2 and x_3 are not new in geographical research explaining land values. The average size per lot x_1 is relatively new variable and first recognized by Husk (1975). Although he included terrain variable in theoretical model, he did not use it in his analysis. The concept of analysing both the between and within variation of estimates appears to be a new

concept in geographical research. Variable x_6 is not in common use in research but it can be replaced by zoning variable. Proximity to water is relatively a common variable in geographical research and it can be treated as a dummy variable in a regression model.

CHAPTER III

URBAN SPRAWL AND SPECULATION

This chapter is concerned with the interrelated questions of urban sprawl, speculation, and the levels of profit being realized by speculators and developers. The chapter begins with a general discussion of urban sprawl and land speculation. Urban sprawl is considered first, with particular attention being devoted to the conditions prevailing in the study area, and of the factors which are encouraging sprawl through it. Speculation is then dealt with. Two models are introduced. The first is intended to show, in a general way, the process by which farm land is converted into lots within subdivisions as it takes place within the study area. As it is developers who are, by definition, responsible for the last stage of this process, the model incorporates their activity as well as that of the speculator.

The second model provides a framework for analyzing the net gains, or losses, made by speculators in the study area.

Having examined the activity of speculators in the study area, attention is turned to developers. Though two types of developer are found in the study area, the differences between them relate to the scale of the operations rather than to the level of their profits, and

attention is focused on the problem of identifying the general range of costs and sale prices that provide the developers with the economic framework for their operations. Though precise profits cannot be identified, because not all the developer's costs are known, the upper level of possible profits is established. As a result, some degree of comparison with the profits made by the speculators can be made; the chapter ends with such a comparison.

The Relationship between Urban Sprawl and Land Speculation

Yearwood (1971, p. 29) stated that the issue of land speculation should not be examined in isolation from, but should be considered in the context of larger issues. The larger issues he considered were, (1) land use practices, (2) control over land uses, (3) private rights, (4) public needs, and (5) public attitudes concerning these issues. The five larger issues indicated by Yearwood can also be found playing a role in the study area as follows.

One above is equivalent to country residential use in Edmonton's periphery, while two above can be equated to land use policies in Edmonton's periphery as indicated in Chapter II under the rural land use policy. Three above means the right of the individual to keep land or to sell it when the situation on the land market indicates a profit can be made. Four above can mean the desire among individuals to own country residences. Although this desire has been considered

in urban research, it has not been clearly defined. For the purpose of this study V.A. Wood et al. (1974, p. 29) was adopted as follows:

> In Canada, the dominant type of shelter is a single family house. This dominance is the result of four general influences: the continuum of the rural tradition of private land ownership into urban settings, the continuum of Western European individual home ownership tradition, the tradition of immigrants generally to realise in North America the dream of individual home ownership . . ."

Urban Sprawl

Urban sprawl is considered here because it is assumed that land speculation and urban sprawl are interrelated. In order to understand land speculation, its prime association with urban sprawl should be clearly understood.

Clark and Harvey (1965, p. 2) defined urban sprawl as follows:

> Sprawl, measured at a movement of time, [it]is composed of areas essentially of urban character located at urban fringes but which are scattered or strung out or surrounded by or adjacent to underdeveloped sites or agricultural uses.

Using this definition, they identified three types of urban sprawl.

(i) Low density sprawl. This is a continuous, low density development in the suburbs.

(ii) Ribbon development sprawl. This type of sprawl is composed of developments which are compact within themselves but which are extended axially and leave area between them undeveloped.

(iii) Leap-frog sprawl. This type is made up of discontinuous compact patches of urban uses.

According to Clark and Harvey, the first form of sprawl is the most desired because it is continuous and little land is left vacant. The provision of services is cheaper and above all, the planning aspects can be implemented to effect orderly arrangement.

The last form of sprawl is the most criticised both from the aesthetic and economic points of view. In a situation where municipal authorities have to provide utilities and other services, these become expensive where there are many scattered subdivisions. This type of urban sprawl is the one found in the study area and considered in this study.

Factors contributing to leap-frog sprawl in the study area Because of the environmental factors outlined in Chapter II and the planning policy in Edmonton's periphery, it is impossible for there to be continuous urban sprawl. The following are some of the factors which make for leap-frog sprawl.

(i) Environmental factors: The area is widely traversed by sand dunes and terminal moraines. Any attempt to develop continuous urban sprawl can reactivate sand dunes. Second, the low lying areas are swampy and may be unsuitable for country residences.

(ii) The nature of rural planning policy as outlined in Chapter II contributes to leap-frogging because the policy stipulates the type of soils on which subdivisions for country residences are permitted. Since the geographical distribution of the land is not continuous, the nature of country residential development currently being enforced

by the Edmonton Regional Planning Commission is leap-frogging sprawl.

(iii) The rapid expansion of the economic base of Edmonton can also motivate the developers to respond to housing demand by building on isolated subdivisions and hence bring about urban sprawl. Clark and Harvey (1962, p. 12) indicated that a rapid rise in the economic base of an urban area can motivate developers to respond to the demand for housing and produce "a variety of discontinuous, unrelated developments". The connection between growth in the economic base and urban sprawl is provided by the increase in population which itself follows from the immigration of people taking up the jobs provided by the expanding economy. The rapid expansion in economic base of Edmonton was mainly facilitated by the discovery of oil reserves in the Province of Alberta in the 1950's.

(iv) The size of the lots also contributes to leap-frog sprawl. The lot sizes for country residences officially range from 1.2 to 8 hectares (3 - 20 acres). With such big lots and the restriction on the land to be subdivided, it is not easy to develop a compact continuous form of development.

Urban sprawl in the study area That there has been urban sprawl in the Edmonton periphery is documented by the data presented in Table 3.1 (p. 76).

Table 3.1 was established using 1957 as the base year. That year was selected because the first subdivision in the study area

TABLE 3.1 THE NUMBER OF LOTS DEVELOPED IN THE STUDY AREA AND PERCENTAGE INCREASE 1957 - 1975

Year	(Increase in) number of lots created	Cumulative number of lots created	Percentage increase
1957	10	10	base
1958-62	0	10	0
1963	20	30	200
1964	39	69	130
1965-67	0	69	0
1968	49	118	71
1969	25	143	21
1970	156	299	109
1971	412	771	157
1972	236	947	22
1973	667	1614	70
1974	521	2134	32
1975*	133	2268	6

Source: County of Parkland Assessor's file

* Figures are limited to summer of that year.

was created at that time.

Table 3.1 indicates a decreasing trend in the percentage of lots created while the actual number in lots created is increasing. This

is so because the number of subdivision lots being created is large and hence it requires a relatively large number of lots to affect a large change in the percentage increase. For instance in 1963 the twenty new lots created accounted for a 200 percent increase whereas in 1974, five hundred and twenty one lots were created and these accounted for only 32 percent increase in lots in the study area.

Table 3.2 (p. 78) shows the population growth of Edmonton.

Like table 3.1, table 3.2 indicates a downward trend in the percentage increases. The comparison between the two tables reveals that the growth in country residential lots is not directly related to the growth in Edmonton's population. If the example of 1973 is considered, it is observed that the population of Edmonton increased by 835 people (0.1 percent) but the number of lots created in the same year was 667. The population increase is so small that it cannot have accounted for the demand for lots especially if it is considered that other lots were developed in the rest of the Edmonton periphery.

Table 3.3 presents the trend of population growth in the Edmonton Metropolitan area between 1956 and 1971. That period is selected because of three reasons, 1) 1956 is the year which preceeded the creation of the oldest subdivision in the study area, 2) 1971 is the year in which extensive subdivision for country residential use in the study area started (see page 76), and 3) the national censuses which indicate the metropolitan population to be used in the comparison below, took place in those years.

TABLE 3.2 THE POPULATION OF EDMONTON SINCE 1957

Year	Population	Population increase	Percentage increase
1956	223,549	base	base
1957	238,353	4,804	6.6
1961	276,018	37,665	15.8
1963	303,756	27,738	10.0
1964	357,696	53,940	17.7
1966	381,230	23,534	6.5
1968	410,265	29,035	7.6
1969	422,418	12,313	3.0
1970	429,750	7,312	1.7
1971	436,264	6,514	1.5
1972	442,365	5,266	1.2
1973	441,530	835	0.1
1974	445,691	3,326	0.7
1975	451,635	5,944	1.3

Source of information: Civic census by L.C. Scott and S.D. Ferguson.

Note Although there were no lots created in the study area in 1956, 1967, and 1960, the population of Edmonton for those years is included in the table above in order to draw up a comparison between table 3.2 and table 3.3. Some years are excluded because there were no lots created in the study area at that time.

The comparison drawn between table 3.2 and 3.3 reveals slow

TABLE 3.3 EDMONTON METROPOLITAN POPULATION FOR SELECTED YEARS BETWEEN 1956 TO 1971

Year	Population	Population growth between 1961-1971	Percentage metropolitan growth in Alberta between 1961 - 71
1956	254,800		
1961	337,569	156,233	56
1966	401,299		
1971	495,702		

Source of information: Census of Canada

growth in the city's population while the metropolitan population is steadily increasing. According to P.J. Smith (1976), the population of Alberta increased by 296,000 between 1961 and 1971, the Edmonton and Calgary metropolitan population increased by 280,000 for the same period. Edmonton metropolitan population increased by 150,200 (Table 3.3). The increase was 56% of the overall metropolitan population growth in Alberta during that period. It appears that the growth which in return motivated growth in country residential lots is mainly due to immigration. As Leszek A. Kosinsiki (1976) indicated, the immigrants to Alberta mainly come from Saskatchewan, Manitoba, Southern Ontario, and to a lesser extent from Quebec and the Maritime Provinces.

The Planning Commission Fact Sheet (1974) indicated that the shift of population growth to smaller towns in Edmonton periphery is due to rising costs of housing in the city of Edmonton. In their words:

> to a greater extent the shift in the location of population growth to the smaller communities may be due to the rising costs of housing relative to incomes and the need for prospective house purchasers to consider lower priced homes outside the City of Edmonton. (p. 14)

However the view indicated above differs from that indicated by V.A. Wood et al. (1974) as follows:

> The desire of contemporary home-buyers for more spacious and more elaborate accomodation at a lower density per unit, consistent with the increasing incomes and social pressures, are being satisfied at increasingly higher costs. The consumer is therefore a major contributor to increasing costs in the urban [and rural] residential land conversion system. (p. 168)

Although Wood's study deals with urban land conversion, he found that the value per lot of serviced residential land in Edmonton satellite towns showed the same trend as that of the city.

The view of this study agrees with Clark and Harvey (1962) that the demand for conversion of rural land which eventually leads to leap-frog sprawl is only related indirectly to the rapid expansion in the population of the urban area, but rather may result from either traditional feeling towards country home ownership or from a change in taste. This view is in agreement with that indicated above by V. Wood et al. (1974). However it is also postulated that both the change in taste and the traditional feeling can be activated by a change in the

economic base of Edmonton.

Land speculation

The issue of land speculation is a controversial one. This is so because of the popularity of that term both in geography and urban land economics. Two diverging definitions are as follows. Marion Clawson (1961, p. 106) referred to land speculation as "bidding up the price of the land far beyond its value for agricultural, forestry or any other rural use ". Clark and Harvey (1965, p. 3) defined land speculation more broadly. In their view, "All incremental additions to urban fringes are speculative ventures."

Neither of these definitions provides a good framework for considering the situation which has prevailed in the Edmonton region for the last fifteen years. The first is too narrow. The second one is so broad that it includes among those who are to be classed as speculators, the farmers who develop their properties into country residential subdivisions.

These are only two of many such definitions in the literature. It is therefore necessary to provide a definition which is appropriate to the conditions prevailing in the study area. The definition used for the purpose of this study is mainly focused on the land speculator rather than on the land speculation because it is intended to identify speculators in land trade and speculative subdivisions in the study area. In the context of this study, a land speculator is defined as: an

individual or a group of individuals or a company who is not registered at the county assessor's office as being agricultural. That individual, or individuals or company bought the land either from a farmer or from a speculator and sold it as a whole, or in large units to another speculator or to a developer without providing any improvements. In the above definition, there are two factors to be observed.

(i) A farmer can only be regarded as a speculator if he ceases to derive his principle income from the land and speculates on his property.

(ii) A farmer can be a developer if he subdivides his land into country residential lots and provides access to the lots.

One other point must be made before leaving this topic. L.B. Smith (1976, p. 2) identified two types of land speculators.

(i) Competitive land speculator. This type of speculator does not consider himself to have any influence on the market price but he believes that the price is going to rise or fall quite independently of his own actions.

(ii) Monopolistic land speculator. This is the type of land speculator who "attempts to buy or control a significant portion of the existing commodity [land] in order to influence market price".

In the terms of Smith's classification of speculators, it is the speculators of the first type who are at work in the study area. This is so because speculators in the study area are mainly dealing with

quarter sections. There is no example of a monopolistic land speculator (County of Parkland, Land ownership map, Public Works Department of the County of Parkland, (1972)). A factor which has tended to keep land ownership widely dispersed, is that most of the farmers acquired their quarter sections after the second world war through the Director of Veteran Administrations. The result was that, as recently as 1970, ownership of the land in the study area was shared by a large number of individuals each of whom owned only a relatively small share of the total.

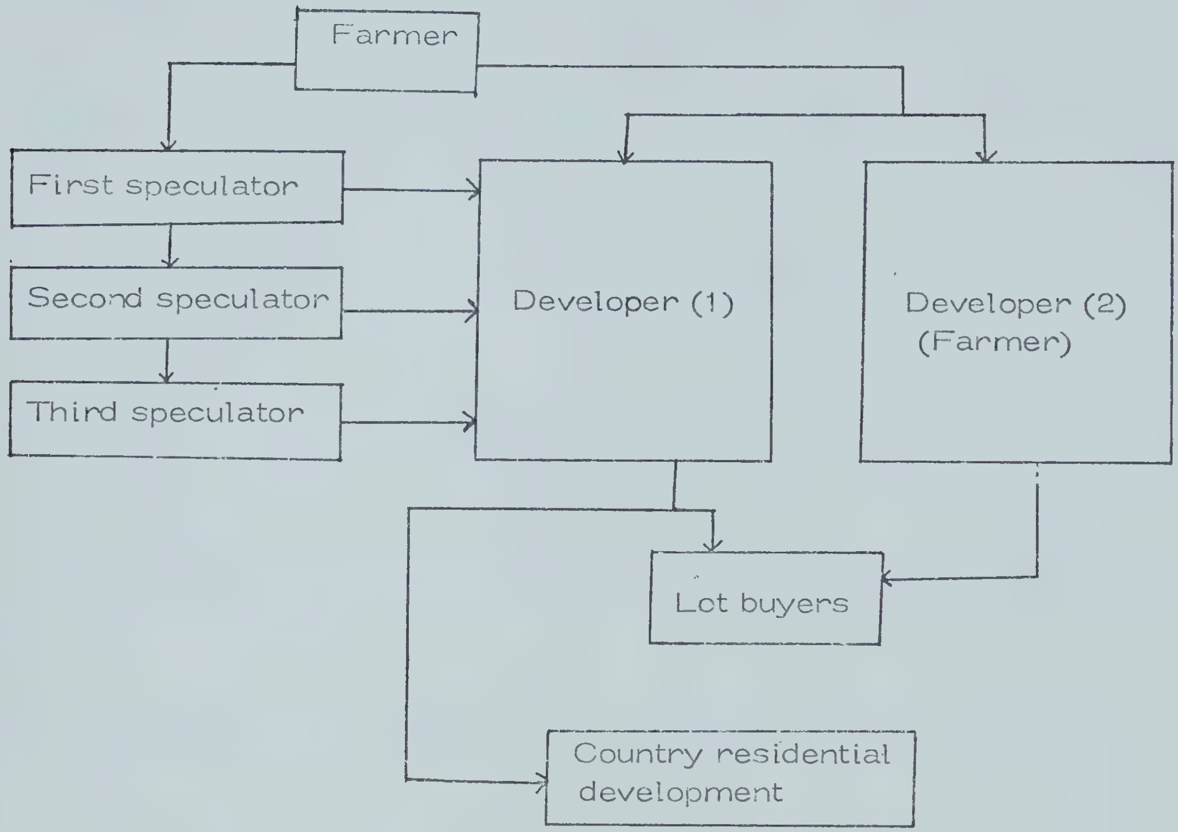
Figure 3.1 (p. 84) indicates that the process of rural land conversion is a simple one because there are no feed-back loops. Once the land is bought by the speculator or a developer it cannot be returned to farming. The process of rural land conversion outlined in Figure 3.1 is in accordance with the opinion of V.A.Wood et al. (1974, p. 9) that

> the conversion of land to urban use is a one-way process. Once . . . land has disappeared under residential subdivision it cannot be reclaimed for agriculture by an increased demand for agricultural products.

Although V. Wood was mainly interested in urban land as such, his views are also true for rural residential land. This inability of agriculture to affect changes on urban land is mainly due to the fact that agriculture, with its extensive use cannot offer rents which are competitive with those bidded by intensive urban uses.

Figure 3.1 also indicates that a land speculator sells the land

FIGURE 3.1 THE FLOW DIAGRAM OF RURAL LAND CONVERSION AND LAND SPECULATION IN PARKLAND COUNTY, ALBERTA



either to another land speculator or to a developer (1). The reason why a speculator sells land to a speculator or to a developer and not a farmer is that once land changes hands, its value also increases. The increase in value reaches a level at which agricultural production ceases to be a viable economic activity.

Figure 3.1 also indicates that there are two types of developers. Developer (1). This type of a developer can be a company or an individual genuinely involved in developing a rural area into a country

residential area. This type of a developer is what Yearwood (1971) referred to as being new in the North American context. He is trading either in serviced lots or serviced lots with residences on them. As the flow chart indicates, the developer in this category has two sources of land supply; he can acquire land directly from the farmer, or he can buy the land from speculators.

Developer (2). This is a developer who was once a farmer but decided to subdivide his farm into lots. As can be observed from Figure 3.1, this type of a developer has no direct relationship with land speculators. There are two reasons for this lack of relationship between developer (2) and land speculators. A developer (2) does not buy land from speculators because;

(i) he is simply converting his farmland into a country residential area;

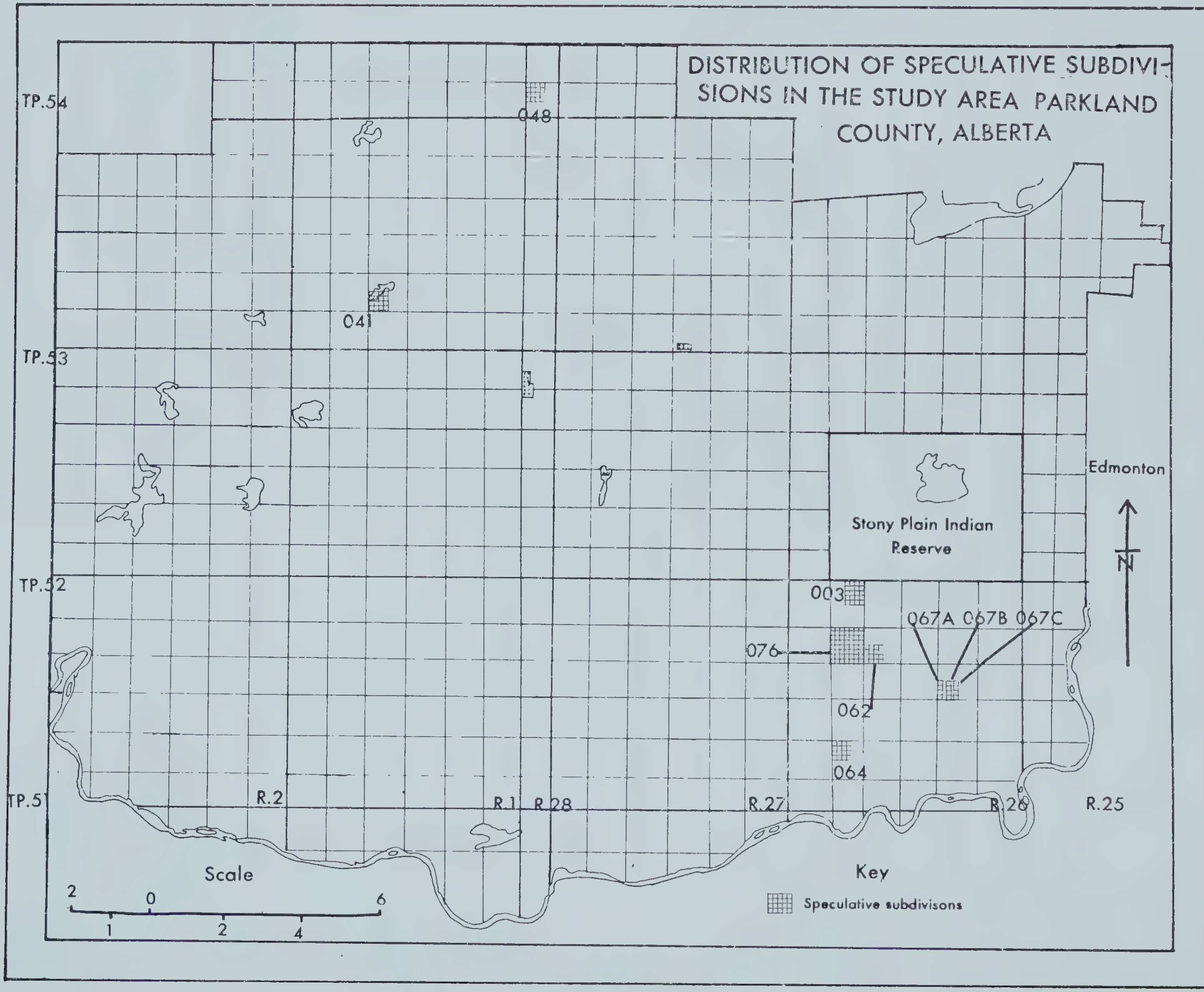
(ii) he lacks the capital which would allow him to buy land at the prices characteristically asked by the speculators.

Distribution of speculative subdivisions in the study area

Figure 3.2 (p. 86) indicates the subdivisions which have experienced land speculation prior to their being developed into country residential areas. All speculative subdivisions with the exception of two are located in township 51, range 26 west of the 4th meridian. This is so because of the following reasons:

(i) Township 51 range 26 west of the 4th meridian is located near

FIGURE 3.2


DISTRIBUTION OF SPECULATIVE SUBDIVI-
SIONS IN THE STUDY AREA PARKLAND
COUNTY, ALBERTA
TP.54
TP.53
TP.52
TP.51
048
041
003
076
062
064
067A 067B 067C
Stony Plain Indian
Reserve
Edmonton
N
R.2
R.1
R.28
R.27
R.26
R.25
Scale
2
0
6
1
2
4
Key
Speculative subdivisons

Edmonton and this can motivate speculative intentions for future urban use.

(ii) The oldest subdivision in the study area is found within that township. The first rural subdivision in Parkland County, established in 1957, was located in township 51, range 26. It is likely that speculators learned from the then subdivision and acquired nearby land which was sold to developers in the early 1970's.

(iii) The township is traversed by environmental characteristics which are not suitable for extensive farming. Among these characteristics are the numerous sand dunes and organic soils. Such characteristics can induce farmers to sell their land to speculators who were willing to buy it for future gain.

It was also observed that speculators were attracted by land which was close to open bodies of water. With the exception of one subdivision in township 51 range 26 west of the 4th meridian, all the speculative subdivisions have either a large expanse of water within their boundaries or on their boundaries. Such subdivisions could be of little benefit to farmers as little land was left for extensive farming, and this could motivate the farmers to sell the land.

The process of land speculation in the study area

Figure 3.3 (p. 88) is a descriptive model of the land speculation process in the study area. It illustrates in schematic form the

FIGURE 3.3 SEQUENCE OF LAND SPECULATION, TYPE OF SPECULATOR, TYPE OF DEVELOPER AND THE TIME LAND WAS HELD IN THE STUDY AREA PARKLAND COUNTY, ALBERTA

Code	Type of speculator	Sequence of speculation	Type of developer
003	Individual	F $\frac{64.7(160)}{1965}$ I $\frac{64.7(160)}{1970}$ D	Individual
041	Company	F $\frac{64.7(160)}{1969}$ C $\frac{10.5(26)}{1970}$ D	Company
048	Mixed	F $\frac{64.7(160)}{Nov.\ 1969}$ C $\frac{64.7(160)}{Dec.\ 1969}$ DS $\frac{64.7(160)}{1970}$ C $\frac{64.7(160)}{1971}$ D	Company
062	Individuals	F $\frac{32.3(80)}{1967}$ I $\frac{7.6(18.9)}{1968}$ I $\frac{7.6(18.9)}{1969}$ D	Individual
064	Company	F $\frac{64.7(160)}{1965}$ C $\frac{64.7(160)}{1967}$ D	Company
067A	Company	F $\frac{32.3(80)}{1963}$ C $\frac{16.1(40)}{1967}$ D	Company
067B	Mixed	F $\frac{16.1(40)}{1967}$ I $\frac{16.1(40)}{1968}$ C $\frac{16.1(40)}{1970}$ D	Company
067C	Company	F $\frac{16.1(40)}{1963}$ C $\frac{16.1(40)}{1969}$ D	Company
076	Company	F $\frac{259(640)}{1961}$ C $\frac{259(640)}{1970}$ D	Company

See figure 3.2 for identification of the codes

I = Individual
F = Farmer
C = Company
D-S = Dental Surgeon
D = Developer
Area in hectares and (acres

Indices indicate the year in which the land was bought

TABLE 3.4 THE MATRIX OF LAND SPECULATION AND THE AREA HELD BY FIRST LAND SPECULATOR IN PARKLAND COUNTY ALBERTA

Code no. of sub-division	Asking price of farmer $	Area bought by a spec-ulator hectares (acres)	Asking price of a spec-ulator $	Area sold by a spec-ulator hectares (acres)	Time of holding	Spec-ulative gross gain $
003	54,000	64.7 (160)	62,000	64.7 (160)	5	8000
041	7,690	64.7 (160)	6,000	10.5* (26)	1	4700
048	5,000	64.7 (160)	12,000	64.7 (160)	1m⊕	7000
062	10,000	32.3 (80)	10,000	7.6* (18.9)	1	7500
064	12,500	64.7 (160)	10,000	64.7 (160)	2	-2500
067A	2,700	32.3 (80)	8,500	16.1* (40)	4	7150
067B	3,350	16.1 (40)	11,000	16.1 (40)	5	7650
067C	5,000	16.1 (40)	7,060	16.1 (40)	6	2060
076	8,000	259 (640)	275,000	259 (640)	9	267,000

Source of information County of Parkland assessor's files
See figure 3.2 for identification of codes
⊕ Indicates where land was held for months otherwise time is indicated in years.

* Only part of subdivision sold by the speculator.

data of tables 3.4 to 3.6 (pp. 89, 91, 92). In figure 3.3 it is shown that in six out of nine speculative cases only one speculator was involved in the land trade. There are two cases where two speculators were involved on the same piece of land but at different times. The subdivisions which experienced this type of speculation were 062 and 067B (see figure 3.2 for the location of the subdivisions). There is one subdivision (048) which experienced triple speculation; in other words, three speculators bought and sold the same piece of land at different times.

Characteristics of land sales in speculation Figure 3.3 reveals three distinct characteristics of speculation.

(i) Wholesale land speculator. This is a land speculator who sells the whole piece of land without retaining part of it for further speculative activity. The subdivisions which exerpienced this type of speculation are 003, 048, 064, 067B, 067C, and 076 (see figure 3.2 for identification of codes).

(ii) Retail land speculator. This is a speculator who divides the land into large tracts and sells pieces to developers at different times. Subdivisions which experienced retail speculation are 041, 062, and 067A. It is also observed in the study area that, 70 hectares (174 acres) are still under speculation on subdivisions 041 and 067A.

(iii) Transformed land speculator. Although in this study, farmers who subdivide their property into residential lots are considered to be developers rather than speculators, those farmers who cease to

TABLE 3.5 THE MATRIX OF LAND SPECULATION AND AREA HELD BY THE SECOND SPECULATOR IN PARKLAND COUNTY ALBERTA

Code	Area bought by a speculator	Asking price of a speculator	Area sold by a speculator	Time of holding	Speculative gross gain
003					
041					
048	64.7 (160)	20,000	64.7 (160)	1	8000
062	7.6 (18.9)	10,000	7.6 (18.9)	1	0
064					
067A					
067B	16.7 (40)	12,500	16.1 (40)	2	1500
067C					
076					

See figures 3.2 and 3.3 for identification of codes and values.

derive their income from agriculture and form a non-agricultural company to deal in land trade are considered as land speculators. From the time when they form a non-agricultural company up to the time they developed the land into residential lots is regarded as the speculative period. This type of speculation is referred to as

TABLE 3.6 THE MATRIX OF LAND SPECULATION AND AREA HELD BY THE THIRD SPECULATOR IN PARKLAND COUNTY ALBERTA

Code	Area bought by a speculator	Asking price of a speculator	Area sold by a speculator	Time of holding	Speculative gross gain
003					
041					
048	64.7 (160)	24,000	64.7 (160)	1	4000
062					
064					
067A					
067B					
067C					
076					

See figures 3.2 and 3.3 for identification of codes and values.

transformed speculation because a farmer transforms himself into a land speculator. Although this type of speculation is not easily presented in the flow chart, research reveals one case where this type of speculation took place. The two farmers who owned an entire subdivision (076) formed a non agricultural company to trade in land. Nine years later they decided to develop the entire section into a

country residential area. From the time they formed the company up to the time the land was developed is considered as a speculative period.

Socio-economic characteristics of speculators

Land speculation is a trade of many people from different walks of life.

In this study two broad classes of speculators are identified in terms of their socio-economic characteristics.

(i) The first class is composed of individuals who are professionally well qualified. Some are medical practitioners, dental surgeons, inspectors, grain handlers, and some are realtors. These are the people who can use the income they have collected from other sources to trade in land.

(ii) The second class is composed of rich companies such as Elks Dominion of Canada, Aberdeen Holdings Limited, Ziegler Stock Farms, and Diamond Investment Company. These companies were actively participating in land speculation in rural land in the Edmonton periphery.

Behaviour of land speculator W. Bahl (1968) defined speculation in land values as "occurring when the land is withheld from the market for economic reasons by a rational (a profit maximizing) individual". However this research revealed that, whatever their motives, some individuals are not successful in obtaining a profit large enough to have justified their activity on economically rational grounds. For

the purpose of this study, the land speculators are divided into two classes in terms of the level of profit thus achieved.

(i) Successful speculators These are the speculators who maximised the profit by bidding the value of the land far above the purchasing price and land taxes. In case where there are no land taxes, the difference between the purchasing price and the selling price represents the speculative gross gain. Subdivisions which were owned by successful speculators are indicated in tables 3.4 to 3.6.

(ii) Unsuccessful speculators This class includes those speculators who sold land at the price they acquired it or sold it for less than their total cost. Two unsuccessful speculators are indicated in tables 3.4 to 3.6. There are a number of causes for unsuccessful speculation. Some of the causes have been identified by Elias and Gillies 1965, p. 793) as follows:

> Catastrophic experiences in investments may weaken the financial position of a speculator in land and force him to sell below the originally determined price.

Such a situation may be due to liquidation of a company where the shareholders in a speculative company are simply interested in taking out their shares with no regard to profit. This was the case with Aberdeen Holdings Limited which speculated on subdivision 064. That company was liquidated during the speculative period and probably had to sell the land holdings to compensate the share holders.

Net speculative gain model

Although the speculators gross gain is indicated in tables 3.4

to 3.6, it is observed that speculators incur taxes as a result of their speculative activities. The objective of the model is to assess the net gain or loss accrued to a land speculator for the period he held the land. The model used is as follows:

$$V_{net} = V_{s.g.g} - (V_{ass}.M_r)t_i$$

where V_{net} = Speculator's net gain

$V_{s.g.g}$ = Speculator's gross gain (selling price − buying price)

V_{ass} = Assessed value of the land

M_r = Mill rates

t_i = The period in years the land was held.

There are four cases when the model can produce different results.

(i) If the asking price of the speculator is less than his purchasing price, the land speculator is viewed to operate at a total loss.

$$V_{net} = -V_{s.g.} - (V_{ass} \cdot M_r)t_i$$

(ii) If the asking price of the speculator is equal to the buying price, that is $V.s.g.g = 0$, the speculator has to pay land taxes from other sources for the period he holds the land.

$$V_{net} = 0 - (V_{ass} \cdot M_r)t_i = \text{Tax}$$

(iii) If the asking price of the speculator is greater than his purchasing price but only high enough to offset the taxes, then the speculator is operating at a break even point.

$$V_{net} = V_{s.g.g} - (V_{ass} \cdot M_r)t_i = 0$$

(iv) If the asking price of the speculator is greater than the

purchasing price and high enough to offset the taxes, the speculator makes a net gain on his property.

$$Vnet = Vs.g.g - (Vass \cdot Mr)ti > 0$$

(The symbol > means greater than)

Using the net g in speculative model, the speculator,s percentage net gain was established as indicated in tables 3.7 to 3.9 (pp. 97, 99, 100). Tables 3.8 and 3.9 are a continuation of table 3.7.

The speculator's percentage net gain as indicated in table 3.7 can be divided into two categories (1) the speculator's percentage net gain which is above a hundred percent, and (2) the speculator's percentage net gain which is below a hundred percent.

The first category can be further subgrouped into three as follows:

i) The speculator who held the land for a short period of one month and sold it at a high price. In such a situation there is no tax paid and the speculator's percentage net gain was high as indicated in table 3.7. This is the case with subdivision 048 where the speculator bought the land from the farmer in November 1969 and sold it to another speculator in December of the same year (see figure 3.3).

ii) The retail speculator who sells a portion of the land and retains the rest for further speculation makes money on his property. A specific example is indicated on subdivision 062 where a speculator bought 32.3 hectares (80 acres). After speculating on the land for

TABLE 3.7 FIRST SPECULATOR'S NET GAIN, PERCENTAGE NET GAIN, AND TAXES INVOLVED IN PARKLAND COUNTY ALBERTA

Code	Assessed value	Time land was held	Tax for period land was held	Gross gain	Net gain	Percentage net gain
003	2820	5	3948	8000	4252	8
041	1300	1	370	4761	4391	354
048	540	1m⊕	0	7000	7000	140
062	415	1	116	7500	7384	310
064	600	2	336	-2500	-2836	-23
067A	170	4	190	7150	6960	554
067B	85	5	119	7650	7531	124
067C	85	6	142	2060	1918	38
076	1350	9	3402	267,000	263,598	3294

Source: County of Parkland assessor's files.
See figure 3.2 for identification of codes.
Percentages are collected to the nearest whole number.
⊕ Indicates where land was held for months otherwise time is indicated in years.
Values are indicated in dollars.

one year he sold a quarter of the land at a price equivalent to amount paid for the whole tract of land (table 3.4). Speculators in this category had a high percentage return on their investment as indicated in table 3.4. Subdivisions which experienced this type of percentage

net gain were 047, 062 and 067A.

iii) The transformed speculator also makes money. As mentioned earlier, this category is composed of individuals who were farmers but ceased to be farmers when they formed a non-agricultural company to speculate on land. An example of this type of speculative net gain is indicated on subdivision 076 where the owners declared a low assurance fund value in 1961 for a period of nine years, and then suddenly in 1970 they raised the value of the land to 275,000 (table 3.4). This was done probably to keep down the effects of taxes during the speculative period since the value per hectare was so small (table 3.10, p.

The second category of the speculator's percentage net gain can be grouped into two as follows: First, where there was percentage gain but less than a hundred percent. In this case subdivisions were held by a speculator for a period of five to six years. The subdivisions in this category are those which experienced a percentage net gain ranging from 8 to 38 percent. Speculator's percentage net gains in this category were lower than those indicated in the previous group for two reasons

(i) The assessed value on subdivision 003 was high and this resulted in taxation having a significant effect on the percentage net gain (table 3.7).

(ii) The asking price of the speculator was too low to offset the taxation effects. This is the situation on subdivision 067C where a

TABLE 3.8 SECOND SPECULATOR'S NET GAIN, PERCENTAGE NET GAIN, AND TAXES INVOLVED IN PARKLAND COUNTY ALBERTA

Code	Time land was held	Tax for period land was held	Gross gain	Net gain	Percentage net gain
003					
041					
048	1	151	8000	7849	65
062	1	116	0	-116	-2
064					
067A					
067B	2	48	1500	1452	13
067C					
076					

See figure 3.2 and table 3.5 for identification of codes and values.

speculator made a net gain of 120 dollars per hectare after holding the land for 6 years (table 3.10).

Finally, there is a case where there was a percentage loss. In other words, the speculator was required to tap other sources of income to meet the taxes for the period he held the land. The speculator on subdivision 064 experienced this type of situation.

TABLE 3.9 THIRD SPECULATOR'S NET GAIN, PERCENTAGE NET GAIN, AND TAX INVOLVED IN PARKLAND COUNTY ALBERTA

Code	Time land was held	Tax for period land was held	Gross gain	Net gain	Percentage net gain
003					
041					
048	1	151	4000	3849	19
062					
064					
067A					
067B					
067C					
076					

See figure 3.2 and table 3.6 for identification of code and values.

As mentioned earlier tables 3.8 and 3.9 are a continuation of the table 3.7. Both of these tables are intended to show the second and the third speculator's percentage net gain at successive speculative periods.

The observation made is that the net percentage gain on each subdivision decreases as the sequence of speculators increases in

number. Table 3.10 (p. 102) presents this information in summary form. The table indicates that the first speculator bought the land at a price of 77 dollars per hectare and sold it at 185 dollars per hectare to make a percentage net gain of 140 percent. The second speculator, who acquired the land at 185 dollars per hectare sold it at 307 dollars per hectare, to make a percentage net gain of 65 percent. The third speculator, who acquired the land at five times what the first speculator paid for it, sold it at 368 dollars per hectare to make a percentage net gain of only 19 percent. The trend observed above is true of all subdivisions in the sample. The reason why this is so is that as land increases in value, it requires an exponentially higher asking price per hectare in order to make a higher percentage net gain. However the whole process of speculation is limited by the fact that there is a limit to what a developer can pay for the rural land. In addition, the effect of tax on return increases as the period of holding increases.

Developer

Under this section the following are considered: (1) the type of developers and their role in rural land conversion in the study area, (2) the estimated costs and profit of the developer, and (3) the comparison between the speculator's percentage net gain and the developer's estimated percentage profit.

TABLE 3.10 A COMPARISON BETWEEN SPECULATOR'S PURCHASING PRICE PER HECTARE, SELLING PRICE LESS TAXES, AND PERCENTAGE NET GAIN

Code	First speculator			Second speculator			Third speculator		
	Purchase price per hectare	Selling price less tax (hectare)	Percentage net gain	Purchase price per hectare	Selling price less tax (hectare)	Percentage net gain	Purchase price per hectare	Selling price less tax (hectare)	Percentage net gain
003	835	903	8						
041	118	538	354						
048	77	185	140	185	307	65	307	368	19
062	310	1300	319	1318	1300	−2			
064	193	149	−23						
067A	83	516	554						
067B	298	875	194	683	773	13			
067C	310	430	38						
078	31	1048	3280						

Types of developers and their role

As is indicated in the rural land conversion flow chart (Figure 3.1), there are two types of developers in the study area. The developers and their roles in rural land conversion are as follows:

Developer (1) This is the type of developer Yearwood (1971) referred to as being new in the North American context. The developer in this category deals with country residential "B" developments. The average lot size in a subdivision is 1.2 hectares (3 acres). In this type of development, lots are serviced, utilities are installed, subdivision roads are constructed, and, sometimes, country residences are built. This type of a developer is composed of large companies with a considerable amount of capital to provide such extensive services. Companies such as Melton Real Estate Company indicated in interviews a preference for this type of development since it reduces the negative externalities on the part of the country residential buyers.

Developer (2) This category is composed of farmers, individuals, small companies who, after constructing the subdivision road and making the survey of the lots, sell the land to country residential lot buyers. The costs of acquiring a residential lot may be less than in (1) above but, according to Zelmer et al. (1974), lot owners have to meet hidden costs. Among the hidden costs are (1) construction of the drive way, the provision of power, the drilling for water and the installation of a pump, as well as the construction of a residence

itself and of as many services as the owner of the lot finds suitable.

This type of subdivision has a number of characteristics which are commonly perceived as advantages by people wishing to buy a country residence, notably the fact that the lot sizes are usually larger than in country residential "B" areas. The lot owners are free to locate anywhere on their lots, and to carry out landscaping which satisfies their own needs. They are also free to choose the architectural modeling which they like since the construction of a residence is done by the lot owner. However there is one main drawback to this type of development, there is no guarantee that the developer in this category will maintain subdivision roads as well as the previous developer. Indeed, there are two reasons why he may be expected to maintain them at a lower standard. i) As indicated earlier, the developer in this category has limited financial resources and is not likely to spend more money on road maintenance. ii) He has no reputation to care for, whereas companies in the first group do care about their reputation. The last two points mentioned above probably account for the numerous pot holes on subdivision roads that were observed during the study tours.

Estimated profit and costs

Because of the problems involved in establishing developers net profit, it is the estimates of profit and costs that will be considered here. V.A. Wood et al. (1974, p.80) indicated the problem of estimating a developers costs as follows:

> The final price per front foot of the lot is not always based on cost + profit = selling price. It is very often calculated on the basis of market - costs = profit.

This lack of the comparative base of the developer's profit is mainly due to uncertainty on the land market. As F. Chapin (1972) indicated, where no recent comprehensive studies of property values has been undertaken, the assessed value on the land can be used as a basis for estimates of values of properties. The estimates of developer's costs are based on 1975 figures which are the only ones made available for the purpose of this study.

The approach developed for this study is to use the equation: asking price of the developer — (purchasing price + basic development costs) = estimated profit. This approach was adopted for the following reasons:

(i) In Parkland County, land is assessed seperately from improvements.

(ii) The assessed value of the land is 27.4 percent of the assessor's appraisal of the market value. Using the effective assessment ratio, it is easy to compute the converted residential value per hectare which is usually the asking price of the developer. In 1975, the assessed value was a reliable indicator of market value because the assessor carried out extensive market value appraisals in 1974 and 1975.

(iii) Basic development costs, as indicated in table 3.11 (p. 107)

are considered instead of the overall costs of services because those are the initial costs the developer should meet before assessor could appraise the market value of the subdivision and the assessed value of the residential land.

(iv) It is also easy to exclude the County of Parkland property. According to the County's land dedication policy, the developer is required to dedicate without compensation some of the area being subdivided, to an upper limit of ten percent for public reserves. Such areas are indicated on the subdivision cards with initial (C.P.) and were excluded from the calculations of the developer's estimated profit.

<u>Developers estimated costs</u> Table 3.11 indicates the developer's basic estimated costs based on 1975 construction estimates. As table 3.11 indicates, it was considered in this study that the developer did not have enough capital at hand, therefore he had to borrow money hoping that it will be recovered at the time of sale. The com panies interviewed on this point agreed that they make use of that facility. The estimated rate of interest is 10 percent for two years. They prefer a short period of two years because after that time interest rate becomes a burden on the part of the developer. They also maintain the subdivision roads for one year.

Table 3.12 (p.) is intended to indicate the initial costs for 1975 based on estimates by the companies interviewed.

The distributions of the values in table 3.12 are not normal,

TABLE 3.11 DEVELOPER'S INITIAL COSTS IN PARKLAND COUNTY ALBERTA 1975

Type of cost	Value in dollars
Construction and maintenance of the subdivision road per lot for one year	3000
Planning approval fee per lot	10
Registration cost per lot	13
Legal survey per lot	140
Return on development capital	10 percent per year for 2 years
Planning consultant's fee	10 percent of the total asking price of the developer

Source: Melton Real Estate Company

as indicated by the relatively large standard deviations. There are two possible explanations for the lack of normality of the distributions.

(i) The geographical and environmental factors discussed in Chapter II of this study do affect the lot sizes and land values, especially in those properties near water.

(ii) The size of the sample is limited to 60 subdivisions because these were the only ones whose assurance fund values were available. If the sample was large enough the distribution of values would probably approach normality as indicated by the central limit theorem (E. Bryant, 1960, p. 64).

TABLE 3.12 DEVELOPER'S INITIAL COSTS PER SUB-DIVISION IN PARKLAND COUNTY 1975

Type of cost	Mean value in dollars	Standard deviations dollars	Number of cases
Maintenance of construction cost of subdivision roads per sub division per year	66,050	41,783	60
Planning approval fee	220	139	60
Registration cost	286	181	60
Legal survey	3082	1949	60
Return on development capital	6609	8624	60
Planning consultant's fee	11,868	7111	60

Table 3.12 indicates that construction and maintenance of subdivision roads, and planning consultant's fees appear to be the most expensive initial costs a developer has to bear in the process of conversion of the rural land into country residential area. The companies interviewed create 23 to 27 lots per subdivision and this would lead construction and maintenance cost to range between 69,000 dollars and 81,000 dollars per subdivision. However this cost can be reduced by appropriate planning techniques where two or more

country residences can be served by the same subdivision road. The planning consultant's fee is high because a planner is viewed as able to reduce the overall developers costs through ample layouts which conform with the Edmonton Regional Planning Commission's regulations.

Developer's estimated percentage profit Because of the problems involved in establishing the developer's hidden costs such as the wages of employees, it is not easy to establish the developer's net gain model. In fact such information which can lead to establishment of a model is known to developers themselves and it is not possible that it is available on subdivision basis since many developers are involved. However the approach developed for this study is based on the concept that asking price of the developer per subdivision — initial costs per subdivision (see table 3.10) = profit. Table 3.13 indicates the results used in the analysis of the developer's estimated profit.

One vital observation to be noted from table 3.13 is that the average developer's purchasing price per hectare is 948 dollars, the net profit per hectare is 926 dollars, yet the overall estimated percentage profit if 365 percent. The explanation for this is that the estimated profits were calculated for each subdivision seperately, these were then converted to percentages. The mean of these 60 percentages is 365, with a standard deviation of 723. The difference between this figure of 365 and the figure of 97 which is the percentage increase between the mean purchase price per hectare and the mean

TABLE 3.13 RESULTS USED IN ESTABLISHING THE DEVELOPER'S ESTIMATED PERCENTAGE PROFIT IN PARKLAND COUNTY ALBERTA 1975

Type of initial cost	Mean	Standard deviations	Number of cases
Converted residential value/subdivision	$151,730	$91,447	60
Number of hectares per subdivision	38	22	60
Developer's purchase price per hectare	$948	$865	60
Developer's gross gain per subdivision	$118,681	$71,114	60
Developer's gross gain per hectare	$3763	$3174	60
Developer's estimated profit/subdivision	$30,564	$46,830	60
Developer's estimated percentage profit per subdivision	365%	723%	60
Developer's estimated profit per hectare	$926	$3088	60
Developer's estimated percentage profit per hectare	365%	723%	60

sale price per hectare for all land taken together, is a result of the fact that there is a wide range of gross profits over the 60 subdivisions. This differs from the generally accepted procedure of

(mean profit — mean purchasing price) × 100 = mean estimated percentage profit, because of the fact that the variables used are interrelated in a ratio form.

A comparison between a speculator's percentage net gain and a developer's estimated percentage profit

The objective of the comparison between the speculator's net gain percentage and the developers estimated percentage profit is to find out who is responsible for upward spiral of rural land values.

A comparison between tables 3.6 to 3.8 and table 3.13 can be drawn as follows. First, let us examine tables 3.6 to 3.8. It is observed that there is a decreasing tendency in the speculator's net gain percentage as the number in the sequence of speculators increases. In actual fact some speculators lose a portion of their investment as a result of their speculative activities. In a case where more than one speculator is involved on the same piece of land but at different times, it is the first speculator who benefits most from holding the land. Second, let us consider the average of the developer's estimated percentage profit. The point to observe is that all the initial costs as indicated in table 3.10 have been deducted and no other costs to be considered since those are the costs the developer should meet before the appraisal of the market value of the land can be done. There is no evidence of forced sales on the part of the developer since the asking price of the developer in all the 60 subdivisions included in the sample was above the purchasing price of the developer.

As table 3.13 indicates, the developers average estimated percentage profit per hectare is 365 percent. It is also dubious that developers do incur the cost 3000 dollars for construction and maintenance of subdivision road per lot for a year. The reason for this is that there are numerous pot holes even on new subdivision roads that make it difficult to justify this cost. This was observed during study tour of the area in summer of 1975.

The findings of this study agree with Marion Clawson (1962) that the rising costs of the land in urban periphery is motivated by developers and not by speculators. What is most criticised is the unearned increments on land but this (unearned increment on land) is relatively small compared to the developers estimated percentage profit as indicated in table 3.13.

CHAPTER IV

SUMMARY AND CONCLUSION

The chapter is divided into seven interrelated sections which are presented in the following arrangement:

Locational aspects and area covered in the study are presented. This is done in order to give a perspective view of the study area.

The sources of the data and the problems involved in handling them are discussed. The objective is to indicate the possible sources of information, and also to pin-point the major problems which may face future researchers in the field of rural land value analysis.

The method of study is presented in a brief form. This section reviews in outline the models used in the study.

The results of the models are presented in a summary form. This is specifically done to help a reader who may be limited by a shortage of time.

The question posed by the results derived from the analysis. This is aimed at bridging the gap between the analytical aspects of the study, and the problem of the rising land values in the urban periphery, as it is experienced in the real world.

A proposal for dealing with the current problems of rising land values on the urban periphery. This is in fact a solution to the question posed above. It is a tentative policy proposal based on current research, both in the United States, and in Canada to deal with the problems of rising land values in the urban periphery.

The last section of the chapter indicates both disadvantages and advantages which may result if such a proposal is adopted. Both advantages and disadvantages are weighted in the light of research, and examples based on the North American context, and in particular the Canadian context.

Study area

The study area extends from the western boundary of Edmonton, westwards to Range 2 west of the 5th meridian. The northern and southern boundary of the area correspond to those of the County of Parkland. It covers an area of 1,226 square kilometres (472 square miles).

Source of data and problems involved

The data used in this study are obtained from the following unpublished sources:

i) The County of Parkland assessor's office.

ii) Ministry of Natural Resources (Alberta).

iii) Melton Real Estate Company's files.

Published sources are also utilized. These include Soil Survey maps made available ty the Department of Agriculture and Soil Sciences

at the University of Alberta, and aerial survey photographs.

There are two main problems which may face a researcher in land value analysis. First, the data are available in unprocessed form. For instance, the assessed residential value is made available on a lot basis. This requires the assembling of all values of lots in a subdivision to get the assessed residential value of a subdivision. As a result of this, a researcher involved spends a considerable amount of time working at the county headquarters. Probably this problem could be greatly reduced if the data were stored, and retrieved using a computer. Second, the most crucial aspect of the study, which is tracing of land ownership takes a great deal of time. The problem is aggravated by the fact that the arrangement of land title books is not a straight forward process. To trace the changing ownership of a single lot requires checking through separate files of cards and thick books, which is a tedious business.

Method of study

As indicated in the course of the study, the analysis was carried out using the following models.

(i) A regression model was used to establish the relationship between the average country residential value per hectare and the parametric variables. The parametric variables considered under the model were: the average lot size, accessibility to the main routes leading to Edmonton, and accessibility to the points of access to Edmonton.

(ii) An analysis of variance model which was applied to establish, and

to assess the variation between average country residential value per hectare and the two of the non-parametric variables. The two non-parametrics are 1) variation in terrain, and 2) soil categories.

(iii) A Chi-square model which was used in establishing the locational effects on average country residential value per hectare. For the purpose of the analysis, the subdivisions used were grouped into two, 1) the near water properties, and 2) away from water properties.

(iv) The speculator's net gain model. It was purposely designed for this study to assess the impact of land speculation on country residential values in the Edmonton periphery.

Apart from the models outlined above, it was also intended to identify speculative subdivisions, and the type of sprawl currently taking place in the study area.

Speculative subdivisions were determined using the definition of a land speculator provided on page 17, and the County of Parkland land title books. Subdivisions which experienced land speculation prior to their development into country residential lots are presented in Figure 3.2.

The type of sprawl currently taking place in the study area is leap-frog sprawl. There are four main reasons which appear to cause that type of sprawl in the study area.

(i) Environmental factors: The area is traversed by sand dunes and terminal moraines. Intensive subdivision of the area can reactivate the sand dunes. A large portion of the area is flat (Figure 3.3), and

may be swampy. Such areas may be unsuitable and expensive for construction of a country residence.

(ii) The Rural Land Use Policy outlined in Chapter II specifies the type of subdivisions to be permitted for country residential use and their location. Since suitable subdivisions for country residential development are not always in proximity to one another, the rural policy seems to encourage leap-frog sprawl.

(iii) The Provincial Agricultural Policy is aimed at the preservation of rich agricultural land in the Province of Alberta. The distribution of such land is not uniform but is interrupted by tracts of terrain of poor agricultural quality (Figure 3.3). The type of sprawl which can be attained under such a policy is leap-frog sprawl.

(iv) The rapid expansion of the economic base of Edmonton can be responsible for leap-frog sprawl. Clark and Harvey have identified the possibility that rapid expansion in economic base of an urban area can lead developers to produce "a variety of discontinuous, unrelated developments".

Results of the models

It was established in the analysis that average lot size is the main factor which affects unit land values in the Edmonton periphery, with the average value per hectare decreasing as the size of the lot increases. The value of the land increases with respect to increase in 1) distance from Edmonton, and 2) the distance from main routes leading to Edmonton. Apart from the geographical research cited in

Chapter II, non-geographers are also aware of the variations in the distribution pattern of land values in the urban periphery. R. Barlowe (1967, p. 83-100) indicated that the increase in land values may not be restricted to areas near the urban centres, but may also be found in other areas. If we take Barlowe's point further, it is the non-continuity in geographical distribution of land suitable for country residential development that may cause modification in the concept of distance decay function.

The analysis of variance model shows that subdivisions with higher slope percentages, and relatively fertile soils were more expensive if considered in terms of value per hectare than the rest.

The chi-square model indicated a significant influence of location with respect to water on average residential value per hectare. The real estate companies interviewed on this point indicated public demand for subdivisions located near water. V.A. Wood et al. (1974, p. 82) analysed the locational demand in the following way.

> The demand . . . is conditioned not only by supply, but also by the amount people are willing to pay to satisfy their desires to live in that area. Obviously, more prestigious areas create a higher demand, and this is reflected in the willingness of the market to pay that price.

Thus locational effects on country residential land values are individual created value, and are expressed in high cost per hectare. In actual fact developers do capitalize on public demand for their profit. Wood et al., (1974, p. 51)

The land speculator's net gain model indicates a decreasing

tendency in the speculator's net gain percentage as the sequency of speculators increases. It was also observed that there are cases of losses and bankruptcy in the process of land speculation. There are two factors which may account for the limitation of the speculator's net gain.

(i) There is an upper limit to the amount of money the developer is willing to pay for any given piece of rural land. This upper limit is usually set by the developer during the bargaining process.

(ii) As W. Bahl (1968) indicated in his land speculation model, there is an optimum period for holding the land. The point to observe is, if the land is held for a longer period than the optimum, then the taxation effect as hypothesised in the model will affect a reduction on the speculator's return.

From these two speculator's main constraints, and analysis accomplished in Chapter III, it appears that developers are the main participants in escalation of land values in the Edmonton periphery. There are three main points in support of applicability of the model in rural land market.

(i) There appears to be no upper limit to the asking price of the developers, especially at inflationary times when individuals consider a country residence as an ideal form of investment.

(ii) The individual's ability to pay for a certain piece of land varies according to the amount of money available either in mortgage

form or in actual saving. If the individuals have much money, they are likely to pay more for a given piece of land than it would cost under well informed market situation. This "willingness to pay" based on improperly researched rural land market is one of the prime causes of rising rural land values. The point to observe is that developers do capitalize on it for their gain.

(iii) The role of Appraiser or Valuer in residential real estate appears to be ineffective. It is assumed that this person or individual should act as a pivot in settling the value per hectare between the asking price of the developer and what actually the lot buyers should pay. In reality it is the reverse.

The view held by this study is that the valuer should base his decisions on land value studies rather than experience.

The land value studies upon which the valuer should base his decisions should include the following:

(i) Assurance fund value of subdivisions which are permitted for country residential development.

(ii) Costs of initial improvements every year (Table 3.10).

(iii) Appraisal of properties at a compound interest of 10% to enable developers to make interest on their properties.

The information provided to lot buyers based on the above mentioned points will provide them with a base to compare the valuer's value of the land and the asking price of the developers. In most cases lot

buyers will pay the price indicated by the valuer since it is likely to be less than the asking price of the developer. Transactions based on such a procedure are likely to reduce the size of escalation of rural estate land values. Probably the ability of individuals to pay for the land would weaken the role of the land valuer in reducing the rate of escalation of land value since they have much money made available to them by money lenders or in the form of mortgages. The emphasis is on the point that if a valuer is able to provide such information, he will be able to remove the socio-psychological implications currently surrounding the land market. The impact of high land values on lot buyers has a long term effect because it is felt after many years of constant payments. Specifically, the market should follow the valuer instead of the valuer following the market.

The question posed by conclusion

What should be done? In most theoretical discussions, the approach to the solution to the problems of rising land values in the urban periphery is only applicable to an ideal market situation. This is a situation where the supply, demand, and basic information for making a rational decision are provided to lot buyers. In reality the land market mechanism is contrary. Very little of basic information is passed to lot buyers.

In view of the prevailing problem of rising land values in the Edmonton periphery, this study intends to make a tentative suggestion to the problem. The suggestion is the extension of police power in the

form of a modified landbank system for country residential development.

There are two aspects indicated in the proposal which require clarification.

Police power

By police power is meant the authority of the state to impose limits on the behaviour of the individual, when it is considered that the good of the society as a whole is enhanced by the imposing of the restrictions. Although police power, so defined, is perceived as being necessary, there are critics who feel that it is, at best, a necessary evil. This point of view was expressed by W. Bryant (1972, p. 127), who was mainly interested in preservation of community's rights in the face of rising land values outlined the role of police power as follows:

> . . ., the police power of a state is used to deprive the owner of the opportunity of making maximum profit out of his land.

On the other hand Yearwood (1971, p. 83), who was interested in usage of police power to limit the negative externalities imposed by one land use on another, maintained that any form of legislation that does not violate a constitutional requirement "must be considered a valid exercise of the police power". He summed up some of the planning aspects which are directly under the autonomy of the police power as follows:

> The enforcement of zoning, subdivision, building, and

> occupancy regulation finds its basis in the police power. p. 84.

According to Yearwood (1971, p. 83) the "basic rule for use of the police power is that its exercise must have a reasonable and substantial connection with the public health, safety, moral, or general welfare." Thus the police power is "based on the fundamental premise of supremacy of the right of the community, or the general public as against individual".

The point to observe is that the police power can be extended to safeguard lot buyers in the periphery.

Modified planned landbank unit V.A. Wood et al. (1974) indicated a planned land bank unit as having the following characteristics:

> [First], it is administrative process: a process of land conversion. Secondly, it is a planning process. And thirdly, the city is extended in large planned units with an integrated extension of services. p.14

A modified form of a planned landbank unit is proposed instead of a planned landbank unit as indicated above because it would be unrealistic that a county or a municipality can be able to provide integrated extension of services to numerous scattered subdivisions. However, the first and the second characteristics as indicated by Wood can be maintained. The concept of a modified planned landbank unit means a situation where the County is required to buy all subdivisions which are suitable and ready for development, and develop them into country residential lots which can be made available to lot buyers. The process should be carried out in consultation with Edmonton Regional

Planning Commission since it has the overall power to decide the sub-divisions to be used for country residences.

The concept of public ownership of land is not new in urban research in North America. A specific example is indicated by Edward Higbee (1960) as follows:

> Communities will have to gain control of the land. To get control they will have to buy it just as any individual would. Cities [Municipalities] will have to engage in real-estate business if the pattern of their future growth is to be rational. p. 186.

There are two major questions facing the proposal.

i) What will be the source of money? This will require municipalities and counties to enter into dialogue with the Provincial Government for money at favourable terms.

ii) How can the counties or municipalities be prevented from escalating rural land values? It will require a provincial policy or extension of police power to control their asking prices. At the same time, the counties and municipalities should be allowed to appraise the value of the land at a specific compound rate to keep up with inflationary nature in the monetary world. The best example of controlling mechanism was indicated in New York State in 1958. According to R.W. Bryant (1971, p.215), the State Legislative granted to its cities a right to condemn predominantly vacant land.

Cities were allowed to assemble large tracts for sale to private developers, but on the condition that the sale price must

be equal to the cost of acquisition and site planning. Although the example indicated above does not limit the developer from escalating land value, it shows how public ownership of land can be controlled. The point to observe is that, if lots are made available to country residential lot buyers, then such a mechanism can reduce land costs tremendously.

The proposal has the following disadvantages, and advantages.

Disadvantages

i) Developer (1) and (2) as they are known today will cease to exist.

ii) The province will have to subsidize the Counties if they are to be the agents in country residential subdivision.

iii) A controversy between municipalities, and counties, and private interpreneurship is inevitable as the case was in Millwood project.

iv) It is not easy to assess the future demand of the land as was shown by the case of Red Deer.

Advantages

i) It will remove so many operators who currently overcrowding real estate market and cause confusion to lot buyers.

ii) It will provide a base for researchers interested in rural land values since the county will be able to provide basic information.

iii) It leaves room for developers with construction companies to be invited by lot buyers to construct residences for them.

iv) Counties and Municipalities will be able to make extensive use

of its ownership of land to control development.

v) The rising land values on the periphery can be controlled.

vi) It will provide a form of investment for the county instead of depending on taxation alone.

vii) Maintenance of both county and subdivision roads are likely to improve because the county will be directly responsible.

The proposal outlined in the chapter can be adopted as a whole or amended by policymakers. However, a policy suggestion in this direction should include 1) increasing research in rural land market, and 2) reduction in rural rising land values; and provision of detailed information to lot buyers. A policy based on those two aspects is of vital importance because in Alberta a country residence is not a prerogative of high income bracket people but low income people do own country residences. This observation leads to a suggestion that a form of provincial administration is required to control the escalating land values in the Edmonton periphery so that those Albertans who cannot afford a country residence now, are also given a chance to realize their dream: Country residential ownership.

BIBLIOGRAPHY

Annual Report. Edmonton Regional Planning Commission. 1971, 1972, 1973.

Asante,O. Edward. The Incidence of Rural Property Taxation in Alberta. Unpublished M.Sc. Thesis, University of Alberta, 1974.

Bahl,W. Roy. "The Role of Property Taxation as a Constraint to Urban Sprawl". Journal of Regional Sciences. Vol.8, 1969.

Blalock, H.M. Social Statistics. McGraw-Hill Book Company, N.Y., 1960.

Barlowe, R. Land Resource Economics: The Economics of Real Property. Printice-Hall, Inc. Englewood Cliffs, New Jersey, 1967.

Bowser, W.E., A.A. Kjearsgaard, T.W. Peters and R.E. Wells. Soil Survey of the Edmonton Sheet. Edmonton: University of Alberta, 1972.

Bryant, R.G.W. Land Private Property Public Control. Harvest House Ltd., Montreal, 1972.

Bryant, E. Statistical Analysis. McGraw-Hill, New York, 1960.

Chapin F. Stuart. Urban Land Use Planning. University of Illinois Press, Illinois, 1972.

Clarke, J. "The Role of Political Position, Family and Economic Linkage in Land Speculation in Western District of Upper Canada 1788-1815." Canadian Geographer. Volume XIX, 1, 1975.

Clark, W.A. and Robert O. Harvey, "The Nature and Economics of Urban Sprawl," Land Economics, Volume 41, 1965.

Clawson, Marion. "Urban Sprawl and Land Speculation in Suburban Land", Land Economics, Volume 38, 1962.

Clawson,Marion. Suburban Land Conversion in United States. Johns Hopkins Press, Baltimore, 1972.

Clonts, A.Howard, "Influence of Urbanization on Land Values at the Urban Periphery", Land Economics. Volume 46, 1970.

County of Parkland. Land Ownership Map. Public Works Department County of Parkland, Alberta, 1972.

County of Parkland. Named Subdivisions. Assessor's Office, Parkland, 1975.

Diemer, H.L. Parkland County Residential Survey. Alberta Land Use Forum, Edmonton, 1974.

Dorfman, R., P. Samuelson and R.M. Solow. Linear Programming and Economic Analysis. McGraw-Hill Book Company, New York, 1958.

Edmonton-Calgary Urban Corridor. Physical and Economic Characteristics. Unpublished report Task Force on Urbanisation and the Future, Edmonton, 1975.

Edmonton Journal. Monday, May 13, 1974.

Elias and Gillies. "Some Observations of the Role of Speculators and Speculation in Land Development." Law Review. University of California, Los Angeles, Vol. 12, 1965.

Ferguson, S.D. and L.C. Scott. 1975 Civic Census. City Clerk's Office, Edmonton, July 4th., 1975.

Ferguson, G. Statistical Analysis in Psychology and Education. McGraw Hill, Inc., New York, 1971.

Fisher, E. and M. Gaffney. "How to Get Better Land for Less". House and Homes. Times, New York, Vol. 18, 1960.

Gaffney, M. "Containment Policies for Urban Sprawl". Government Research Series No:27. University of Kansas Press (no date).

Garner, B.J. and M.H. Yeates. The North American City. Harper and Row Publisher, N.Y., 1971.

Government of Alberta. Assessment Manual. Queen's Printer, Edmonton, 1967.

Government of Alberta. Committee Report. Task Force on Urbanisation and the Future, Edmonton, 1972.

Government of Alberta. The Town Planning Act. Queen's Printer, Edmonton, 1974.

Hassbring, L.M. A Geographical Analysis of Land Use in Edmonton Fringes. Unpublished M.A. Thesis, University of Alberta, 1969.

Hain, Ben-Shahar, Adam Mazor and David Pines. A Linear Programming Model for Optimizing Land Use. Centre for Urban and Regional Studies, University of Tel-Aviv, 1971.

Higbee, Edward. The Squeeze: Cities Without Space. William Morrow, N.Y.,1960.

Hushak, L.J. "The Urban Demand for Urban-Rural Fringes Land." Land Economics. May, 1975.

Knos, S. Duane in Berry, B.J. and Duane, F.M. Spatial Analysis. Prentice-Hall, Englewood Cliffs, New Jersey, 1968.

Kosinski, L.A. "How Population Movement Reshapes the Nation". Canadian Geographical Journal, May/June 1976.

Laidlaw, D. Charles. Linear Programming for Urban Development and Plan Evaluation. Praeger Publishers, New York, 1972.

Land Speculation Tax Act. Law Society of Upper Canada. Dept. of Continuing Education. 1974.

Land Values. Report on Proceedings of a Colloquim Held in London Under the Auspices of Action Society Trust. Swelt and Maxwell, London, 1965.

Lindsay, J.D., Odynsky, Peters, T.W. and Bowser, W.E. Soil Survey of the Buck Lake and Wabamun Lake Areas. University of Alberta, Bulletin No. SS-7, 1968.

McCracken. Brief on Community Planning and Development. Unpublished report provided, Melton Real Estate Company, 1976.

Miller, R.J. and W.S. Pattison. Rural Real Estate Values in Alberta. Department of Agriculture, Alberta, 1973.

Miller, R.J. and G.R. White. Rural Real Estate Values in Alberta. Department of Agriculture, Alberta, 1974.

Moncreiff, P.M. and W.E. Phillips. "Rural-Urban Interface Acreage Developments". Canadian Journal of Agricultural Economics. Vol. 20, Fall 1972.

Munger, A. James. "Components of Rural Land Values in Northern Wisconsin". Land Economics. Volume 40, 1964.

Norman, H. Nie. Statistical Package for Social Sciences. Second Edition, McGraw-Hill Book Company, N.Y., 1975.

Outline Plan Township 51 Range 26 West of 4th Meridian. Edmonton Regional Planning Commission. 1974.

Position Paper. Edmonton-Calgary Urban Corridor, Physical and Economic Characteristics. Unpublished Report, Task Force on Urbanisation and the Future, Edmonton, 1975.

Rancich, T. Michael. "Land Value Changes in Area Undergoing Urbanisation". Land Economics. Volume 46, 1970.

Reynolds J.L. "How to Buy Land in the Country". Quest: Canada's Urban Magazine. January/February. 1976.

Rural Land Use Policy. Queen's Printer, Edmonton, 1975.

Ruttan, W.Vernon. "The Impact of Local Population Pressure on Farm Real Estate Values in California". Land Economics. Volume 37, 1961.

Schechter, H.B. "Cost-Push of Urban Growth". Land Economics. Volume 37, pp. 18-31, 1961.

Smillie, K.W. An Introduction to Regression and Correlation. Department of Computing Sciences, University of Alberta, 1965.

Smith, L.B. "The Ontario Land Speculation Tax: An Analysis of an Unearned Increment Land Tax." Land Economics. Vol. 52, 1976.

Smith, P.J. "Edmonton and Calgary: growing together." Canadian Geographical Journal. May/June, 1976.

Statistics Canada, 1971 Census of Canada, Bulletin 1.1-2. Information Canada, Ottawa, 1973. p 2-107.

Suits, B. Daniel. "Use of Dummy Variables in Regression Equations". American Statistical Association Journal. December, 1957.

Waldo, D.Robert. "Urban Land: Values and Accessibility". Land Economics. Volume 50, 1974.

Wendt, F. Paul and W. Goldener. "Land Values and the Dynamics of Residential Location". <u>Essays in Urban Land Economics.</u> Real Estate Research Programme, University of California, Los Angles, 1966.

Whitehead, J. <u>Country Residential Growth in Calgary Region: A Study of Exurbanisation.</u> Unpublished M.A. Thesis, University of British Columbia, 1969.

Wise, O. James and Dover Jackson. "An Evaluation of Statistical Methods of Appraising Rural Property". <u>Appraisal Journal</u>. Vol. 74, 1974.

Wood, V.A. et al. <u>Urban Residential Land Development.</u> Alberta Land Use Forum, Edmonton, 1974.

Yearwood, M. Richard. <u>Land Subdivision Regulation and Legal Considerations for Urban Planning.</u> Praeger Publishers, Inc., N.Y., 1971.

Zelmer, A.C.L. et al. <u>Rural Life: An Introduction</u>. Department of Extension, The University of Alberta, 1974.